DIET & DIET REFORM

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BY

M. K. GANDHI

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M. K. GANDHI

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EDITOR'S NOTE

Health is undoubtedly of supreme importance to man, for without it it is not possible for the average individual to develop in mind or spirit. And just as bodily health is essential for mental and spiritual development, even so nourishing food is essential for bodily health. Unless the body gets from food all that it requires to keep it in a fit condition, it will suffer from disease, prevent the individual from functioning to his full capacity and cause early death. So it is most necessary that we should become diet-conscious and should concern ourselves with feeding the body with the kind of food it requires.

Gandhiji's interest in food arises partly from his concern for those around him. When he took to public life he had a group of followers and their children living with him. He held himself responsible for their well-being. Naturally, therefore, when any of them fell ill he had to see what could be done to restore them to health. He did not wish to use drugs if he could help it, as he believed they were injurious to the human system. He was convinced that disease was due to some maladjustment in the system, and that all that was necessary to overcome it was to help nature to rectify the wrong. A fruitful way of aiding nature to do this and maintaining the body in health, he believed, was through proper diet. He therefore became involved in research on Diet.

Moreover, Hinduism had always laid great stress on the subject. Even the *Bhagavadgita* speaks of the various psychological effects produced by different kinds of food, and there is a rich mine of literature, tradition and folklore in India regarding dieting for health. So Gandhiji's interest in questions relating to Diet is nothing strange. It is in line with India's ancient wisdom.

Only the rest of us of today have tended to ignore the vital importance of Diet and have made of food a mere matter of habit and taste. The result is that all of us, both rich and poor, educated and illiterate, the former probably even more than the latter, suffer from the ill effects of malnutrition. We are going in for highly processed foods like polished rice, white flour, sugar and vegetable 'ghee' in the place of the more wholesome unpolished rice, whole-wheat flour, *gur* and pure ghee. Even our cooking is faulty. We throw away the water in which rice is boiled. We fry till most of the valuable elements in the food-article have been destroyed. We do not eat enough greens, fruits or vegetables, and we consume milk-sweets, tea and coffee instead of milk.

In regard to all these Gandhiji has some wise things to say. And not from mere theory or second-hand knowledge, for his *ashramas* were always places where he incessantly carried on experiments in Diet. He started his dietetic experiments, as a matter of fact, very early, even when he was an eighteen-year old student. The reader will find his experiments on uncooked food, recorded in *Young India* and included in Chapters 3 to 7 of Part I of this book, interesting not only from the dietetic point of view but also as revealing the eager scientific mind which he brought to bear on the subject. Ever since, he has been carrying on experiments on Diet. He has experimented with ovens, vessels for cooking, quantity of water to be used, steaming, boiling, baking, determining what ingredients are to be used or avoided in cooking, various ways of making bread, manufacture of jams and *murabbas* out of fruits and orange-skins which might otherwise be wasted or thrown away, use of green leaves as salads, preparing dishes out of oilcake and Soya Beans, combining various articles to constitute a balanced diet, and making up of suitable diets for invalids and convalescents. He had the weights of his ashramites recorded regularly and observed carefully the effects on them of changes introduced in their diet. He took nothing for

granted. His experiments were conducted with a view to finding out the most wholesome food and the wisest way of preparing it, all the time keeping in mind the poverty of our people and their slender resources.

The aim of this book is to bring together Gandhiji's writings on the subject in his weeklies, the *Young India* and the *Harijan*. As Gandhiji himself could not give exclusive attention to a study of this subject, he obtained the help of experts in the field. Their opinion and the writings of others interested in the topic were published in the *Harijan*. Gandhiji's writings are included in Part I of this book, and those of others in Part II. For the convenience of the reader the matter has been arranged topically, so that from a mere glance at the table of Contents a person may be able to pick out readily what he is seeking. In some cases the titles of the articles have been changed, and only relevant portions and not the entire articles reproduced.

Much research requires still to be carried on, both in laboratories and in homes, on matters pertaining to Diet. Even more, the knowledge we already have needs to be put into practice and to be broadcast. Food is a matter on which we are very conservative. If this booklet stimulates research, makes at least some people take interest in what they eat and leads them to reform their food habits, it will fulfil its purpose. Considering the importance of the subject, the overwhelming ignorance and apathy which prevail in regard to it are most deplorable, and need to be combated. It is to serve towards this end that this book is published.

Bombay, November 20, 1948 BHARATAN KUMARAPPA

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NON-ENGLISH WORDS WITH MEANINGS

Ahimsa (ahimsaa) : non-violence
Amla (aamlaa) : the Indian gooseberry
Amti (aamtee) : a liquid dish of vegetable and pulse, a kind of soup
Arhar : a kind of pulse
Aryan (aaryan) : of the Indo-European stock
Atta (aataa) : flour
Bhakari (bhaakaree) : a bread
Brahmachari (brahmachaaree) : one observing continence
Brahmacharya : continence
Chakki (chakkee) : a grinding stone
Chamar (chamaar) : a cobbler
Chapati (chapaatee) : a cake
Chatni (chatnee) : a paste of coconut kernel, chillis, tamarind, salt etc. ground on a stone
Chhatak (chhataak) : 2 ounces (oz)
Chula (chulaa) : an Indian stove
Dahi (dahee) : curds
Dal (daal) : pulse
Dalia (daliya) : porridge
Dasyu : an outcaste
Dhenki (dhenkee) : a wooden contrivance for pounding rice
Dudhi : a white pumpkin
Ghani (ghaanee) : an oil-press
Gur (goor) : jaggery
Hakim (hakeem) : a Muslim physician
Himsa (himsaa) : violence
Kadai : a frying-pan
Khoa (khoaa) : dried milk
Masala (masaalaa) : condiments

Nakli ghee (naklee) : imitation ghee
Neem : the Indian margosa tree
Roti (rotee) : a bread
Ragi (ragee) : an Indian millet
Sadavrata (sadaavrata) : a religious daily distribution of food to mendicants, a place where it is done
Tava (tavaa) : an iron pan for baking cakes
Til (teel) : sesamum
Vaid : a Hindu physician
Vanaspati (vanaspatee) : hydrogenated oil, vegetable ghee

DIET AND DIET REFORM

PART I

SECTION I: GENERAL

1

MY FAITH IN VEGETARIANISM

The Gandhis were Vaishnavas. My parents were particularly staunch Vaishnavas...Jainism was strong in Gujarat, and its influence was felt everywhere and on all occasions. The opposition to and abhorrence of meat-eating that existed in Gujarat among the Jains and Vaishnavas were to be seen nowhere else in India or outside in such strength. These were the traditions in which I was born and bred.

* * *

A wave of "reform" was sweeping over Rajkot at the time when I first came across this friend...It began to grow on me that meat-eating was good, that it would make me strong and daring, and that, if the whole country took to meat-eating, the English could be overcome...It was not a question of pleasing the palate. I did not know that it had a particularly good relish...We went in search of a lonely spot by the river, and there I saw, for the first time in my life—meat. There was baker's bread also. I relished neither. The goat's meat was as tough as leather. I simply could not eat it. I was sick and had to leave off eating. I had a very bad night afterwards. A horrible nightmare haunted me. Every time I dropped off to sleep it would seem as though a live goat were bleating inside me, and I would jump up full of remorse. But then I would remind myself that meat-eating was a duty and so become more cheerful. My friend was not a man to give up easily. He now began to cook various delicacies with meat, and dress them neatly...This went on for about a year. But not more than half a dozen meat

feasts were enjoyed in all. . . .If my mother and father came to know of my having become a meat-eater, they would be deeply shocked. This knowledge was gnawing at my heart. Therefore I said to myself: "Though it is essential to eat meat, and also essential to take up food 'reform' in the country, yet deceiving and lying to one's father and mother is worse than not eating meat. In their lifetime, therefore, meat-eating must be out of the question. When they are no more and I have found my freedom, I will eat meat openly, but until that moment arrives I will abstain from it." This decision I communicated to my friend, and I have never since gone back to meat.

*   *   *

I was yet a stripling of eighteen without any experience of the world. . .I sailed at last from Bombay. . .An English passenger, taking kindly to me, drew me into conversation. . .He laughed at my insistence on abjuring meat, and said in a friendly way when we were in the Red Sea: "It is all very well so far but you will have to revise your decision in the Bay of Biscay. And it is so cold in England that one cannot possibly live there without meat." "But I have heard that people can live there without eating meat," I said. "Rest assured it is a fib," said he. "No one, to my knowledge, lives there without being a meat-eater. . .You cannot live without meat." "I thank you for your kind advice, but I have solemnly promised to my mother not to touch meat, and therefore I cannot think of taking it. If it be found impossible to get on without it, I will far rather go back to India than eat meat in order to remain there."

*   *   *

I could not relish boiled vegetables cooked without salt or condiments. The landlady was at a loss to know what to prepare for me. We had oatmeal porridge for breakfast, which was fairly filling, but I always starved at lunch and dinner. The friend continually reasoned with me to eat meat, but I always pleaded by vow and then remained silent. Both for luncheon and dinner we

had spinach and bread and jam too...there was no milk either for lnnch or dinner...One day the friend began to read to me Bentham's *Theory of Utility.* I was at my wits' end. The language was too difficult for me to understand. He began to expound it. I said: "Pray excuse me. These abstruse things are beyond me. I admit it is necessary to eat meat. But I cannot break my vow. I cannot argue about it...A vow is a vow. It cannot be broken." The friend looked at me in surprise. He closed the book and said: "All right. I will not argue any more."

* * *

I launched out in search of a vegetarian restaurant. The landlady had told me that there were such places in the city. I would trot ten or twelve miles each day, go into a cheap restaurant and eat my fill of bread, but would never be satisfied. During these wanderings I once hit on a vegetarian restaurant in Farringdon Street. The sight of it filled me with the same joy that a child feels on getting a thing after its own heart. Before I entered I noticed books for sale exhibited under a glass window near the door. I saw among them Salt's *Plea for Vegetarianism.* This I purchased for a shilling and went straight to the dining room. This was my first hearty meal since my arrival in England. God had come to my aid. I read Salt's book from cover to cover and was very much impressed by it. From the date of reading this book, I may claim to have become a vegetarian by choice. I blessed the day on which I had taken the vow before my mother. I had all along abstained from meat in the interests of truth and of the vow I had taken, but had wished at the same time that every Indian should be a meat-eater, and had looked forward to being one myself freely and openly some day, and to enlisting others in the cause. The choice was now made in favour of vegetarianism, the spread of which henceforward became my mission.

* * *

My faith in vegetarianism grew on me from day to day. Salt's book whetted my appetite for dietetic studies. I went in for all books available on vegetarianism and read them. One of these, Howard Williams' *The Ethics of Diet*, was a "biographical history of the literature of humane dietetics from the earliest period to the present day.". . Dr. Anna Kingsford's *The Perfect Way in Diet* was also an attractive book. Dr. Allinson's writings on health and hygiene were likewise very helpful. He advocated a curative system based on regulation of the dietary of patients. Himself a vegetarian, he prescribed for his patients also a strictly vegetarian diet. The result of reading all this literature was that dietetic experiments came to take an important place in my life. Health was the principal consideration of these experiments to begin with. But later on religion became the supreme motive.

* * *

Meanwhile my friend had not ceased to worry about me. . . When he came to know that I had begun to interest myself in books on vegetarianism, he was afraid lest these studies should muddle my head ; that I should fritter my life away in experiments, forgetting my own work, and become a crank. He therefore made one last effort to reform me. He one day invited me to go to the theatre. Before the play we were to dine together at the Holborn Restaurant, to me a palatial place and the first big restaurant I had been to since leaving the Victoria Hotel. . . The friend had planned to take me to this restaurant evidently imagining that modesty would forbid any questions. And it was a very big company of diners in the midst of which my friend and I sat sharing a table between us. The first course was soup. I wondered what it might be made of, but durst not ask the friend about it. I therefore summoned the waiter. My friend saw the movement and sternly asked across the table what was the matter. With considerable hesitation I told him that I wanted to inquire if the soup was a vegetable soup. "You are too clumsy for decent society," he passionately

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exclaimed, " If you cannot behave yourself, you had better go. Feed in some other restaurant and await me outside." This delighted me. Out I went. There was a vegetarian restaurant close by, but it was closed. So I went without food that night. I accompanied my friend to the theatre, but he never said a word about the scene I had created. On my part, of course, there was nothing to say.

* * *

There was a Vegetarian Society in England with a weekly journal of its own (the London Vegetarian Society and its paper *The Vegetarian*—R. W.) I subscribed to the weekly, joined the society and very shortly found contact with those who were regarded as pillars of vegetarianism, and began my own experiments in dietetics. I stopped taking the sweets and condiments...I gave up tea and coffee as a rule, and substituted cocoa...There were many minor experiments going on along with the main one; as for example, giving up starch foods at one time, living on bread and fruit alone at another, and once living on cheese, milk and eggs. This last experiment is worth noting. It lasted not even a fortnight...I gave up eggs and the experiment alike...This was a hardship inasmuch as inquiry showed that even in vegetarian restaurants many courses used to contain eggs. Full of the neophyte's zeal for vegetarianism, I decided to start a vegetarian club in my locality, Bayswater. I invited Sir Edwin Arnold, who lived there, to be Vice-President. Dr. Oldfield who was Editor of *The Vegetarian* became President. I myself became the Secretary. The club went well for a while, but came to an end in the course of a few months. For I left the locality...

* * *

On the eve of my departure for home...I invited my vegetarian friends to dinner in the Holborn Restaurant referred to in these chapters. "A vegetarian dinner could be had," I said to myself, "in vegetarian restaurants as a matter of course. But why should it not be possible in

a non-vegetarian restaurant too ? " And I arranged with the manager of the Holborn Restaurant to provide a strictly vegetarian meal. The vegetarians hailed the new experiment with delight.

(From *Autobiography*)

* * *

2

THE MORAL BASIS OF VEGETARIANISM

[Address to the London Vegetarian Society by Gandhiji on 20th November, 1931.]

When I received the invitation to be present at this meeting, I need not tell you how pleased I was, because it revived old memories and recollections of pleasant friendships formed with vegetarians. I feel especially honoured to find on my right Mr. Henry Salt. It was Mr. Salt's book, *A Plea for Vegetarianism,* which showed me why, apart from a hereditary habit, and apart from my adherence to a vow administered to me by my mother, it was right to be a vegetarian. He showed me why it was a moral duty incumbent on vegetarians not to live upon fellow-animals. It is, therefore, a matter of additional pleasure to me that I find Mr. Salt in our midst.

I do not propose to take up your time by giving you my various experiences of vegetarianism, nor do I want to tell you something of the great difficulty that faced me in London itself in remaining staunch to vegetarianism, but I would like to share with you some of the thoughts that have developed in me in connection with vegetarianism. Forty years ago I used to mix freely with vegetarians. There was at that time hardly a vegetarian restaurant in London that I had not visited. I made it a point, out of curiosity, and to study the possibilities of vegetarianism and vegetarian restaurants in London, to visit every one of them. Naturally, therefore, I came into close contact with many vegetarians. I found, at the tables, that largely the conversation turned upon food and disease. I found

also that the vegetarians who were struggling to stick to their vegetarianism were finding it difficult from the health point of view. I do not know whether, nowadays, you have those debates, but I used at that time to attend debates that were held between vegetarians and vegetarians, and between vegetarians and non-vegetarians. I remember one such debate, between Dr. Densmore and the late Dr. T. R. Allinson. Then vegetarians had a habit of talking of nothing but food and nothing but disease. I feel that that is the worst way of going about the business. I notice also that it is those persons who become vegetarians because they are suffering from some disease or other — that is, from purely the health point of view — it is those persons who largely fall back. I discovered that for remaining staunch to vegetarianism a man requires a moral basis.

For me that was a great discovery in my search after truth. At an early age, in the course of my experiments, I found that a selfish basis would not serve the purpose of taking a man higher and higher along the paths of evolution. What was required was an altruistic purpose. I found also that health was by no means the monopoly of vegetarians. I found many people having no bias one way or the other, and that non-vegetarians were able to show, generally speaking, good health. I found also that several vegetarians found it impossible to remain vegetarians because they had made food a fetish and because they thought that by becoming vegetarians they could eat as much lentils, haricot beans, and cheese as they liked. Of course those people could not possibly keep their health. Observing along these lines, I saw that a man should eat sparingly and now and then fast. No man or woman really ate sparingly or consumed just that quantity which the body requires and no more. We easily fall a prey to the temptations of the palate, and therefore when a thing tastes delicious we do not mind taking a morsel or two more. But you cannot keep health under those circumstances. Therefore I discovered that in order

to keep health, no matter what you ate, it was necessary to cut down the quantity of your food, and reduce the number of meals. Become moderate; err on the side of less, rather than on the side of more. When I invite friends to share their meals with me I never press them to take anything except only what they require. On the contrary, I tell them not to take a thing if they do not want it.

What I want to bring to your notice is that vegetarians need to be tolerant if they want to convert others to vegetarianism. Adopt a little humility. We should appeal to the moral sense of the people who do not see eye to eye with us. If a vegetarian became ill, and a doctor prescribed beef tea, then I would not call him a vegetarian. A vegetarian is made of sterner stuff. Why? Because it is for the building of the spirit and not of the body. Man is more than meat. It is the spirit in man for which we are concerned. Therefore vegetarians should have that moral basis—that a man was not born a carnivorous animal, but born to live on the fruits and herbs that the earth grows. I know we must all err. I would give up milk if I could, but I cannot. I have made that experiment times without number. I could not, after a serious illness, regain my strength, unless I went back to milk. That has been the tragedy of my life. But the basis of my vegetarianism is not physical, but moral. If anybody said that I should die if I did not take beef-tea or mutton, even under medical advice, I would prefer death. That is the basis of my vegetarianism. I would love to think that all of us who called ourselves vegetarians should have that basis. There were thousands of meat-eaters who did not stay meat-eaters. There must be a definite reason for our making that change in our lives, for our adopting habits and customs different from society, even though sometimes that change may offend those nearest and dearest to us. Not for the world should you sacrifice a moral principle. Therefore the only basis for having a vegetarian principle is, and must be, a moral one. I am not to tell you, as I see and wonder about the world, that vege-

tarians, on the whole, enjoy much better health than meat-eaters. I belong to a country which is predominantly vegetarian by habit or necessity. Therefore I cannot testify that that shows much greater endurance, much greater courage, or much greater exemption from disease. Because it is a peculiar, personal thing. It requires obedience, and scrupulous obedience, to all the laws of hygiene.

Therefore, I think that what vegetarians should do is not to emphasize the physical consequences of vegetarianism, but to explore the moral consequences. While we have not yet forgotten that we share many things in common with the beast, we do not sufficiently realize there are certain things which differentiate us from the beast. Of course, we have vegetarians in the cow and the bull — which are better vegetarians than we are — but there is something much higher which calls us to vegetarianism. Therefore, I thought that, during the few minutes which I give myself the privilege of addressing you, I would just emphasize the moral basis of vegetarianism. And I would say that I have found from my own experience, and the experience of thousands of friends and companions, that they find satisfaction, so far as vegetarianism is concerned, from the moral basis they have chosen for sustaining vegetarianism.

In conclusion, I thank you all for coming here and allowing me to see vegetarians face to face. I cannot say I used to meet you forty or fortytwo years ago. I suppose the faces of the London Vegetarian Society have changed. There are very few members who, like Mr. Salt, can claim association with the Society extending over forty years. Lastly, I would like you, if you want to, to ask me any questions, for I am at your disposal for a few minutes.

Mr. Gandhi was then asked to give his reasons for limiting his daily diet to five articles only, and replied : That has no connection with vegetarianism . . There was another reason. I had been a pampered child of nature. I had acquired then that notoriety that when I was invited

to friends, they placed before me ample dishes of food. I told them I had come there to serve, and, personally, I should find myself dying by inches if I allowed myself to be pampered like that. So, in limiting myself to five ingredients of food, I served a double purpose. And I must finish all my eating before sundown. I have been saved many pitfalls by that. There are many discoveries about that in regard to health reasons. Dietists are saying we are more and more tending towards simplifying diet, and that if one must live for health, one must have one thing at a time and avoid harmful combinations. I like the process of exclusion better than that of inclusion, because no two doctors have the same opinion.

Then I think those restrictions to five articles of food have helped me morally and materially — materially, because in a poor country like India it is not always possible to procure goat's milk, and it is a hard thing to produce fruit and grapes. Then, I go to visit poor people, and if I expected hot-house grapes, they would banish me. So, by restricting myself to five articles of food, it also serves the law of economy.

Harijan, 20-2-1949

3

DIET FOR BRAHMACHARYA

Control of the palate is the first essential in the observance of the vow. I saw that complete control of the palate made the observance very easy and so I now pursued my dietetic experiments not merely from the vegetarian's but also from the *brahmachari's* point of view. I saw as the result of these experiments that the *brahmachari's* food should be limited, simple, spiceless, and, if possible, uncooked.

Six years of experiment have showed me that the *brahmachari's* ideal food is fresh fruit and nuts. The immunity from passion that I enjoyed when I lived on this food was unknown to me after I changed that diet. *Brahmacharya* needed no effort on my part when I lived on fruits and nuts alone. It has been a matter of very great effort ever since I began to take milk. How I had to go back to milk from a fruit diet will be considered in its proper place. It is enough to observe here that I have not the least doubt that milk diet makes the *brahmacharya* vow difficult to observe. Let no one deduce from this that all *brahmacharis* must give up milk. The effect on *brahmacharya* of different kinds of food can be determined only after numerous experiments. I have yet to find a fruit substitute for milk which is an equally good muscle-builder and easily digestible. The doctors, *vaids* and *hakims* have alike failed to enlighten me. Therefore though I know milk to be partly a stimulant, I cannot, for the time being, advise any one to give it up.

Young India, 27-1-1927

4

GREENS AND DIETETIC AHIMSA

Dietitians are of opinion that the inclusion of a small quantity of raw vegetables like cucumber, vegetable marrow, pumpkin, gourd etc. in one's menu is more beneficial to health than the eating of large quantities of the same cooked. But the digestion of most people are very often so impaired through a surfeit of cooked fare that one should not be surprised if at first they fail to do justice to raw greens, though I can say from personal experience that no harmful effect need follow if a tola or two of raw greens are taken with each meal provided one masticates them thoroughly. It is a well established fact that one can derive a much greater amount of nourishment from the same quantity of food if it is masticated well. The habit of proper mastication of food inculcated by the use of uncooked greens therefore, if it does nothing else, will at least enable one to do with less quantity of food and thus not only make for economy in consumption but also automatically reduce the dietetic *himsa* that one commits to sustain life. Therefore whether regarded from the viewpoint of dietetic or that of *ahimsa* the use of uncooked vegetables is not only free from all objection but is to be highly recommended. Of course it goes without saying that if the vegetables are to be eaten raw, extra care will have to be exercised to see that it is not stale, over-ripe or rotten or otherwise dirty.

Young India, 15-11-1928

5

'FOOD FADDISTS'

I have been known as a crank, faddist, mad man. Evidently the reputation is well deserved. For wherever I go, I draw to myself cranks, faddists and mad men. Andhra has its fair share of all these. They often find their way to Sabarmati. No wonder then that I found these specimens in abundance during my Andhra tour. But I propose to introduce to the reader only one fellow crank who by his living faith in his mission compelled my admiration and induced me to plunge into a dietetic experiment which I had left unfinished at the age of 20 when I was a student in London. This is Sundaram Gopalrao of Rajahmundry. The ground was prepared for him by a survey superintendent whom I met at Vizagapatam and who told me he was practically living on raw food. Gopalrao has a Nature Cure establishment in Rajahmundry, to which he devotes the whole of his time. He said to me, 'The hipbaths and other kindred appliances are good so far as they go. But even they are artificial. To be rid of disease it is necessary to do away with fire in the preparation of foods. We must take everything in its vital state even as animals do.'

'Would you advise me to adopt entirely raw diet?' I asked.

'Certainly, why not? I have cured cases of chronic dyspepsia in old men and women through a balanced diet containing germinating seeds,' was Gopalrao's reply.

'But surely there should be a transition stage,' I gently remonstrated.

'No such stage is necessary,' rejoined Gopalrao. 'Uncooked food, including uncooked starch and proteid are any day more digestible than cooked. Try it and you will feel all the better for it.'

'Do you take the risk? If the cremation ceremony takes place in Andhra, the people will cremate your body with mine,' I said.

'I take the risk,' said Gopalrao.

'Then send me your soaked wheat. I recommence from today,' I said.

Poor Gopalrao sent the soaked wheat. Kasturbai, not knowing that it could possibly be meant for me, gave it to the volunteers who finished it. So I had to commence the experiment the following day 9th May. It is therefore now a month when I am writing these notes.

I am none the worse for the experiment. Though I have lost over five pounds in weight, my vitality is unimpaired. During the last eight days the weight has shown a decided tendency to increase.

Fellow faddists should know what I am doing.

I take generally :

8 tolas of germinating wheat,
8 tolas of sweet almonds reduced to a paste,
8 tolas of green leaves pounded,
6 sour lemons, and
2 ounces of honey.

Wheat is replaced twice or thrice during the week by an equal quantity of germinating gram. And when gram is taken in the place of wheat, cocoa-nut milk replaces almond paste. The food is divided into two parts, the first meal is taken at 11 a.m. the second at 6-15 p.m. The only thing touched by fire is water. I take in the morning and once more during the day boiling water, lemon and honey.

Both wheat and gram germinate in 36 hours. The grain is soaked in water for twentyfour hours. The water is then strained. The grain is then left in a piece of wet Khadi overnight. You find it sprouting in the morning ready for use. Those who have sound teeth need not pound the grain at all. For cocoa-nut milk a quarter of the kernel is grated fine and you squeeze the milk through a piece of stout Khadi.

It is unnecessary to enter into further details. What I have given is enough for diet reformers to help me with their suggestions. I have lived for years on uncooked

fruits and nuts but never before beyond a fortnight on uncooked cereals and pulses. Let those therefore who know anything of unfired food favour me with literature or their own experiences.

I publish the facts of this experiment because I attach the greatest importance to it. If it succeeds it enables serious men and women to make revolutionary changes in their mode of living. It frees women from a drudgery which brings no happiness but which brings disease in its train. The ethical value of uncooked food is incomparable. Economically this food has possibilities which no cooked food can have. I therefore seek the sympathetic help of all medical men and laymen who are interested in reformed dietetics.

Let no one blindly copy the experiment. I have not Gopalrao's faith. I do not claim success for it yet. I am moving cautiously. The facts are published so as to enable me to compare notes with fellow food reformers.

Young India, 13-6-1929

6

UNFIRED FOOD EXPERIMENT

Unusual and unexpected interest has been evoked by my experiment in unfired food. It has given rise to interesting and instructive correspondence. I observe that there is quite a number of men living on unfired food and many more who have at one time lived on such food. My correspondents will excuse me for my not acknowledging all such letters individually. But they may rest assured that I have taken in whatever was new and acceptable in their suggestions. Several have asked me for further information on the progress of my experiment.

The experiment still continues. There have been moments when I have weakly doubted the wisdom of continuing it. This was when extreme weakness had overtaken me during the Andhra tour. But my faith in the correctness of the theory behind unfired food and my

partiality for it are so great that I would not easily give up the experiment. For it has for me a value not merely sanitary but also economic and moral or spiritual. It is of great importance to national workers who have to work in different parts of the country often in trying circumstances. This food surmounts all the difficulty arising from the different food habits of the different provinces. But of this more if I can write of the experiment with fairly absolute confidence. At the time of writing all I can say is that it seems to have done me no harm. Dr. Ansari, who knows my body well, examined it carefully whilst I was in Delhi on the 5th instant and was of opinion that he had never found me to be in better health than now. My blood pressure (systolic) which after the breakdown at Kolhapur had never been found to be below 155 was now registered at 118, pulse pressure at 46. Though 118, he thought to be subnormal, it was no bad sign as I had just risen from a slight attack of malaria and I was then living on juicy fruits only.

My resolve to continue the experiment has been considerably strengthened by reading Dr. Muthu's great work on Tuberculosis and Colonel McCarrison's instructive and carefully written food primer. The former contains an illuminating chapter on diet and the latter which is dedicated to the children of India is popularly written and gives in a very concise manner all the information on nutrition that a layman need possess. It is a book which needs to be read with caution. It puts, naturally for the author but unduly, according to my experiences, much emphasis on the necessity of animal food such as meat or milk. The unlimited capacity of the plant world to sustain man at his highest is a region yet unexplored by modern medical science which through force of habit pins its faith on the shambles or at least milk and its by-products. It is a duty which awaits discharge by Indian medical men whose tradition is vegetarian. The fast developing researches about vitamins and the possibility of getting the most important of them directly from

the sun bid fair to revolutionize many of the accepted theories and beliefs propounded by the medical science about food. Be that as it may, both these authors seem to me to agree that it is best to take all foods in their natural state if we are to derive the highest benefit from them and especially if we are not to destroy some of the important vitamins they contain. They opine that fire destroys some of the vitamins and the most essential salts and vitamins are removed when the covering of wheat is removed for the attainment of extreme fineness or of rice for its polish.

In my previous article, I have warned the reader against copying my experiment. But after two months' trial I am able to say with confidence that anyone may try it provided he retains a small quantity of milk and ghee. Though my own experiment is both unfired and milkless, I am not yet in a position to recommend avoidance of milk and ghee. Though my belief in the possibility of avoiding milk and ghee without endangering health is unshakable, I cannot claim as yet to have found a combination of vegetarian foods that will invariably produce the results claimed today for milk. These authors are undoubtedly of opinion that a little addition of milk and — or — ghee (pure) raises the food value of vegetarian proteids and fats and promotes assimilation of the latter.

I may now tell the reader what I am taking at present :

Sprouted wheat	..	tolas	8
Pounded almonds	..	„	4
Whole almonds	..	„	1
Green vegetable, e.g., marrow (*dudhi*) or cucumber or the like (grated)	..	„	16
Raisins (or fresh fruits)	..	„	20
Lemons	..	„	2
Honey	..	„	4

Neither the quantity nor the variety is absolutely fixed. Often I avoid almonds or wheat or both. Sometimes I take sprouted gram and grated cocoanut instead

of wheat and almonds. The reader need not take honey. He may take *gur* but in no case white sugar which is decidedly harmful. Sugars are best obtained from raisins, figs or dates all of which should be taken in moderation. He may increase the quantity of wheat if he finds it to be insufficient. In the beginning stages there will probably be a feeling of emptiness. It will be due to the fact that by ill usage the stomach is distended. Till it assumes its natural size, the emptiness should be put up with. It may be partly overcome by taking juicy fruit or a little more vegetable or better still by drinking plenty of water, never by exceeding the maximum quantity of wheat or gram. Milk may undoubtedly be increased if the purse allows it. Over thirty comrades have taken up the experiment with me. The maximum fixed for them is :

Sprouted wheat	..	tolas	20
„ gram	..	„	8
Vegetables	..	„	16
Cocoanut	..	„	8
Kismis (raisins)	..	„	4
Lemon	..	„	1
Milk	..	lb.	½
Fresh fruit when available			
Ghee instead of cocoanut	..	tolas	2

The quantity of milk and ghee is the minimum. Those who need more are at liberty to take more. We all take a little salt. I omitted it for one month. But some medical friends have warned me against giving it up. And fancying that I was feeling weak or being really weak, I began taking salt in Almoda. The quantity taken by me is not more than 30 grains during the day. Honey is taken 3 times a day separately with hot water. Too much stress cannot be laid on the great necessity of thorough mastication. We have so ill used our teeth and gums that we now find it difficult to make proper use of them.

Young India, 18-7-1929

7

UNFIRED FOOD

The interest evinced in my experiment in unfired food and the testimony received in support are truly remarkable. Some correspondents even send their experiences for publication. But I refrain. I have found among enthusiasts a tendency towards exaggeration. They often build their conclusions on insufficient data or see a connection between a result and their experiment not warranted by actuality. Whilst therefore these experiences are very helpful to me, as I am able to check them by my own, I am chary of sending them out as a guide to fellow seekers. I therefore propose periodically to give the verified results of my own experiences and observation coupled with the caution that even they are liable to variation. I have found after prolonged experiment and observation that there is no fixed dietetic rule for all constitutions. All that the wisest physicians claim for their advice is that it is likely to benefit in a given case as in a majority of cases they have found it to answer fairly well. In no branch of science is the scientist so hampered in his research as in the medical. He dare not speak with certainty of the effect of a single drug or food or of the reactions of human bodies. It is and will always remain empirical. The popular saying that one man's food may be another's poison is based on vast experience which finds daily verification. Such being the case, the field for experiment on the part of intelligent men and women is limitless. Laymen ought to acquire a workable knowledge of the body which plays such an important part in the evolution of the soul within. And yet about nothing are we so woefully negligent or ignorant as in regard to our bodies. Instead of using the body as a temple of God we use it as a vehicle for indulgences, and are not ashamed to run to medical men for help in our effort to increase them and abuse the earthly tabernacle.

But now for noting the results to date:

1. There are now twenty two in the Mandir making the experiment with me. Most of them have given up milk.

2. They are now having bananas added to their diet and the quantity of cocoanut taken has been increased.

3. It can be stated with tolerable confidence that when milk is retained there is no danger of weakness or any other untoward result.

4. There is no difficulty about digesting uncooked sprouted grains and pulses and uncooked green vegetables.

5. Cases of consumption have in most cases yielded to the elimination of grains and pulses and a liberal use of cocoanut milk and green vegetables such as *dudhi* (marrow), pumpkin, cucumber, etc., all taken with their skins well washed. Cocoanut milk is prepared by grating an undried cocoanut fine and mixing it with its own or other clean water and straining and pressing through a stout cloth. A whole cocoanut may be thus taken without the slightest injury or discomfort.

6. In the majority of cases weight has been lost, but the medical authorities who favour unfired food assert that the loss of weight is a healthy reaction up to a point and is a sign of the body throwing off poisonous matter.

7. The majority still experience weakness but persist in their experiment, believing in the above mentioned authorities that weakness is an intermediate stage in this experiment. There is no doubt that the stomach which has undergone distention through overfeeding with starchy and fatty foods feels an emptiness till it resumes its natural size.

8. The experiment is not an easy thing nor does it yield magical results. It requires patience, perseverance and caution. Each one has to find his or her own balance of the different ingredients.

9. Almost every one of us has experienced a clearer brain power and refreshing calmness of spirit.

10. Many have found the experiment as a decided help in allaying animal passion.

11. Too much stress cannot be laid on the imperative necessity of thorough mastication. I observe that even many of the careful inmates do not know the art of mastication and have therefore bad teeth and spongy gums. A few days of hard and conscientious chewing of the cocoanut and green vegetable has brought about wonderful results in this direction.

Several physicians are taking an interest in my experiment. They send me texts from Ayurvedic writings for or against the articles I have been using. Two or three have sent me the identical text against taking honey mixed with hot water and pronouncing dire results. When I ask them whether they have verified the text from their own experience they are silent. My own experience of taking honey mixed with hot water extends to more than four years. I have experienced no ill effect whatsoever. Objection has also been raised against the use of honey on humanitarian grounds. This objection has, I admit, considerable force though the Western method of gathering honey is cleaner and less open to objection. I fear that if I would be strictly logical I should have to cut down many things I take or use. But life is not governed by strict logic. It is an organic growth, seemingly irregular, growth following its own law and logic. I began taking honey in Yeravda jail under medical advice. I am not sure that its use is now necessary for me. Western doctors bestow high praise upon it. Most of them who condemn the use of sugar in unmeasured terms speak highly of honey which they say does not irritate as refined sugar or even *gur* does. I do not want to weaken my present experiment by abjuring honey just now. The humanitarian aspect will be infinitely more served, if the unfired food experiment succeeds beyond doubt.

Another physician quotes a text against the use of sprouted pulses but he too lacks actual experience for supporting his text. And this has been my complaint

against many Ayurvedic physicians. I have no doubt that there is abundant ancient wisdom buried in the Sanskrit medical works. Our physicians appear to be too lazy to unearth that wisdom in the real sense of the term. They are satisfied with merely repeating the printed formula. Even as a layman I know many virtues are claimed for several Ayurvedic preparations. But where is their use, if they cannot be demonstrated today? I plead for the sake of this ancient science for a spirit of genuine search among our Ayurvedic physicians. I am as anxious as the tallest among them can be to free ourselves from the tyranny of Western medicines which are ruinously expensive and the preparation of which takes no count of the higher humanities.

Young India, 8-8-1929

8

UNFIRED FOOD

Dear Sir:

I have read the further account of your dietetic experiment — reprinted in the *Hindu* of July 22 — with much interest; and I am glad to see that you do not carry your objections to milk and its products to the extent of recommending the 'youth of India' not to use it. Indeed, you are, if I may say so, recording the results of your experiment with much open-mindedness. But there are in your account two mis-statements of fact: (a) the capacity of the plant-world to sustain man at his highest is not an unexplored field to modern medical science, and this science has shown it to be not unlimited: one reason for the nutritive limitations of a purely vegetable diet for man is the difference in length and structure between the human gastro-intestinal tract and that of herbivorous animals. Man's digestive tube is not long enough nor capacious enough to accommodate a sufficient mass of suitable vegetable food, nor to extract from such as it can contain all the nutriment man needs for *his fullest well-being*; (b) there is only one vitamin — vitamin D — for which man can rely (to a considerable extent) upon the sun. There are, of course, more things in Heaven and Earth than are dreamt of in our philosophy; but so far as nutritional science has progressed, there is nothing to indicate the possibility of 'getting

the most important of the vitamins from the sun,' though, no doubt, the sun plays a great part in their production in the foods available for mankind. There are, by the way, no vitamins which can truthfully be said to be more important than others.

One of the *great* faults in Indian diets at the present day is their deficiency in vitamin A, in suitable proteins and in certain salts; and the greatest nutritional need of India is the freer use of good milk and its products which supply these factors. There can be no doubt in the minds of those of us who have devoted a life-time to the study of nutrition that milk is one of the greatest blessings given to mankind. And to one like myself, whose work is to learn the Truth and spread it, the scarcity of this food in India and the lack of appreciation of its value are matters of grave concern. Do not, I beg of you, decry it; for a pint of milk a day will do more for 'Young India' than most things I wot of. It is, for example, to deficiency of vitamin A that we owe so much disease of the bowels and lungs, so much disease of the bladder (such as 'stone') and so much anaemia in this country.

I am glad you are interesting yourself in the matter of food and I agree with much that you say. But let me assure you that a little more 'fortissimo' on the 'milk and milk-products theme' will do great good when you are leading the orchestra of Truth.
Coonoor, 26-7-1929.

I am,
Yours sincerely,
R. McCarrison

P. S.—When next you make an Andhra tour, avoid "the extreme weakness" which overtook you in your last one, by taking a pint of milk a day!

I publish this letter thankfully and wish that other men versed in medical science would also guide me. In making the experiment, I am trying to find out the truth about food in so far as it is possible for a layman to do so.

As for Dr. McCarrison's argument about the necessity of animal food, I dare not as a layman combat it, but I may state that there are medical men who are decidedly of opinion that animal food including milk is not necessary for sustaining the human system to the full. By instinct and upbringing I personally favour a purely vegetarian diet, and have for years been experimenting in finding a suitable vegetarian combination. But there is no danger of my decrying milk until I have obtained over-

whelming evidence in support of a milkless diet. It is one of the many inconsistencies of my life that whilst I am in my own person avoiding milk, I am conducting a model dairy which is already producing cow's milk that can successfully compete with any such milk produced in India in purity and fat content.

Notwithstanding Dr. McCarrison's claim for medical science I submit that scientists have not yet explored the hidden possibilities of the innumerable seeds, leaves and fruits for giving the fullest possible nutrition to mankind. For one thing the tremendous vested interests that have grown round the belief in animal food prevent the medical profession from approaching the question with complete detachment. It almost seems to me that it is reserved for lay enthusiasts to cut their way through a mountain of difficulties even at the risk of their lives to find the truth. I should be satisfied if scientists would lend their assistance to such humble seekers.

I am thankful for Dr. McCarrison's more accurate statement about vitamins.

Young India, 15-8-1929

9

UNFIRED FOOD

Instead of hopeful progress I have to report a tragedy this week. In spite of great carefulness in experimentation along an unbeaten track, I have been laid low. A mild but persistent attack of dysentery has sent me to bed and not only to cooked food but also to goat's milk. Dr. Harilal Desai used all his skill and patience to save me from having to go back to milk, which I had left last November in the hope of not having to go back to it, but he saw that he could not reduce the mucus and the traces of blood that persistently appeared in the bowels without making me take curds. At the time of writing this therefore I have had two portions of curds, with what effect I shall note at the foot of this article which is being written on Sunday night.

It appears that I was not digesting the raw foods I was taking, and what I had mistaken for good motions were precursors of dysentery. The other conditions including vitality being good, I had no cause to suspect any evil.

My companions too have one after another fallen off, except four, of whom one has been on raw food for nearly a year with great success as he thinks.

The companions have left off because they were feeling weak and were losing weight week by week.

Thus Sjt. Gopalrao's claim that unfired food is suitable for any stomach and can be taken with impunity by young and old, sick and healthy is to say the least of it 'unproven'. This apparent failure should serve as a warning to the zealots that they should move most cautiously and be scrupulously exact in their statements and careful in their deductions.

I call the failure apparent, because I have the same faith in unfired food today that I first had nearly forty years ago. The failure is due to my gross ignorance of the practice of unfired food and of right combinations. Some of its good results are really striking. No one has suffered seriously. My dysentery has been painless. Every doctor who has examined me has found me otherwise in better health than before. For my companions I have been a blind guide leading the blind. I have sadly missed the guidance of some one who has known the virtue of unfired food and who would have the patience of a scientist.

But if I regain my health and have a little leisure, I hope to revert to the experiment with better hope in that I shall know what mistakes to avoid. As a searcher for Truth I deem it necessary to find the perfect food for a man to keep body, mind and soul in a sound condition. I believe that the search can only succeed with unfired food, and that in the limitless vegetable kingdom there is an effective substitute for milk, which, every medical

man admits, has its drawbacks and which is designed by nature not for man but for babies and young ones of lower animals. I should count no cost too dear for making a search which in my opinion is so necessary from more points of view than one. I therefore still seek information and guidance from kindred spirits. To those, who are not in sympathy with this phase of my life and who out of their love for me are anxious about me, I give my assurance that I shall not embark upon any experiment that would endanger my other activities. I am of opinion that though I have been making such experiments since the age of 18, I have not often suffered from serious illness and have been able to preserve tolerably good health. But I would also like them to feel with me that so long as God wants me for any work on this earth, He will preserve me from harm and prevent me from going too far.

Those who are making the experiment must not give it up because of the temporary check I have received. Let them learn from the causes of my failure.

1. If there is the slightest danger of insufficient mastication, let the ingredients be finely pulverized and dissolved in the mouth instead of being swallowed.

2. If there is an undissolved residue in the mouth, it must be put out.

3. Grains and pulses should be used sparingly.

4. Green vegetables should be well washed and scrapped before being used and should also be used sparingly.

5. Fresh and dried fruits (soaked)and nuts should be the staples at least in the beginning stages.

6. Milk should not be given up till the unfired foods have been taken without any harm for a sufficiently long period. All the literature I have read points to fruits and nuts with only a small quantity of green vegetables as a perfect food.

[I am able to report on Tuesday morning that diluted curds are working well.]

Young India, 22-8-1929

10

NATIONAL FOOD

I believe that we should be able to accommodate ourselves to the food eaten in the provinces other than our own. I know that this is not so simple a question as it appears. I know southerners who have made a herculean effort to take to Gujarati food and failed. Gujaratis will not take to the southern mode of cooking. Bengal produces dainties which the other provinces will not easily relish. If we would be national instead of Provincial, we would have to have an interchange of habits as to food, simplify our tastes and produce healthy dishes all can take with impunity. This means a careful study of the foods taken by different Provinces, castes and denominations. Unfortunately, or fortunately, there are not only different combinations in different Provinces, but there are different styles in the same Province, among the different communities. It is necessary, therefore, for national workers to study the foods and the methods of preparing them in the various Provinces and discover common, simple and cheap dishes which all can take without upsetting the digestive apparatus. In any case, it must be a matter of shame for workers not to know the manners and customs of different Provinces and communities. In liberal households cooks ought to be able to cook foods eaten in the various Provinces. Why should not a Gujarati be able to produce dishes which a Tamilian or an Andhra or a Bengali ordinarily eats? I know that we cannot meet at the top. Nor is such a meeting necessary or desirable. Rich people will have not only Provincial combinations but specialities designed for their own households. These cannot be universalized. What can be and should be aimed at are common dishes for common people. This I know is easily possible if we have the mind. But to make this possible, volunteers will have to learn the art of cooking and for this purpose they will have also to study the

values of different foods and evolve common dishes easily and cheaply prepared.

Harijan, 5-1-1934

11

MINIMUM DIET

What statistics I have received go to show that all over India except in the Punjab, the articles of diet the masses live on are deficient in nutritive value.

The most helpful pamphlet on the minimum diet scale is the one prepared by Dr. H. V. Tilak, on behalf of the Bombay Presidency Baby and Health Week Association (Delisle Road, Bombay 11). It is called *Balanced Diets.* Its price is 4 annas. It has been translated in Marathi and Gujarati. The diet recommended by the pamphlet, containing a variety of whole grain (some of which is sprouted) including soya beans, dried skim milk and vegetables, increases a white rat to 55 grammes in weight from 13 grammes when fed on a diet containing an excess of highly polished rice with very little vegetables and milk. The diet scale recommended in the pamphlet has been prepared after careful experimentation. It costs in Bombay Rs. 5/- per month. I have my doubts about the possibility of introducing soya beans and dried skim milk in the poor man's diet even in a place like Bombay. The sprouting of pulses and malting of *jowari* recommended by Dr. Tilak is also very difficult of enforcement in private households. It is almost impossible of introduction in villages. Skim milk is unobtainable in the villages, and I know that in hundreds of them not a drop of fresh milk or good ghee is to be had. I mention these difficulties in order that taking Dr. Tilak's carefully prepared scale as a basis, experts may work out a scale more suited to the villages in their provinces and yet produce the results that Dr. Tilak's diet is claimed to have achieved.

Harijan, 31-8-1935

12

FOR FOUR RUPEES A MONTH

Dr. Aykroyd, Director of Nutrition Research at Coonoor, recently delivered an instructive lecture at Bangalore. From the lecture as published in the daily press it appears that a well-balanced diet need not cost more than Rs. 4/- per month. Thus the lecturer said that

> "the dietary requirements of an adult man per day were 16 oz. of soya bean, two oz. of *arhar dal* an oz. of jaggery, four oz. each of spinach and amaranth, an oz. each of potatoes and colacacia 1.5 oz. of cocoanut oil and six oz. of buttermilk — all costing about two annas."

Harijan, 12-10-1935

13

A TALK TO VILLAGE WORKERS

[The following is an extract from a summary made by M.D. of a talk given by Gandhiji to village workers who were his guests on the 22nd October, 1935.]

As today's menu was selected by me with some careful thought, and especially with a view to the needs of village workers, I must speak to you about it at some length. The idea was to provide you with food, nourishing and yet within the means of an average villager and within the possibility of an eight hours' minimum wage as we have fixed it, i.e., 3 annas.

We were 98 diners today and the total cost of our food was Rs. 9-14-3, which means that each meal cost slightly more than 6 pice. Here are the details :

		Rs.	as.	ps.
36 lb.	Wheat Flour	1	8	0
12 ,,	Tomatoes	0	11	3
4 ,,	Jaggery	0	6	3
24 ,,	Red Gourd	0	7	6
6 ,,	Linseed Oil	1	2	0
50 ,,	Milk	3	13	0
4 ,,	Soya Beans	0	6	0
4	Cocoanuts	0	4	0
16	*Koth* Fruit	0	2	0
	Tamarind & Salt	0	2	3
	Fuel	1	0	0
	Total	9	14	3

Vinoba had passed on the suggestion to me that I need not worry about giving all of you *roti* but might simply give you wheaten porridge (that we have here every morning) and thus save a lot of trouble. No, said I to myself, you young men whom God has given strong teeth must have good hard well-baked *bhakri* which any-one can make, which one can easily carry on one's person from place to place, and which can keep for a couple of days. Before the dough was kneaded it was treated with linseed oil. This rendered it both soft and crisp. Then, as we must have some greens and raw vegetables, we had tomatoes and two *chatnis* — one made of *koth* fruit available in plenty in these parts and another made of leaves available in our garden. *Koth* fruit is known for both its aperient and astringent properties and jaggery goes well with it and makes a delicious *chatni*. The other *chatni* contained some cocoanut, tamarind and salt to spice the leaves. Green leaves must be eaten by us in some form or other in order that we may get proper vita-min in our diet. The vegetable chosen was the cheapest available and grows everywhere in our villages. You will see that I allowed the use of tamarind in the preparation

of *chatni.* In spite of the popular prejudice against tamarind, it has been found that it is a good aperient and blood-purifier, I gave copious doses of tamarind water to one of the inmates suffering from malaria with very good effect and have tried it in several cases of constipation.

Milk is an essential article of diet. Your menu contained half a pound of milk, but you must have seen that I gave you no ghee. I hope, however, that you did not miss it. For I gave you soya beans and oil. Soya beans are rich in oil (20 per cent) and proteins (40 per cent). Groundnuts also are rich in oil, but they have the disadvantage of containing too much starch from which soya beans are comparatively free. Milk with soya beans give us almost all that we need in the shape of fats and there is no need for ghee at all. Why then go to all the wasteful trouble of making ghee ? And where procuring good ghee is a doubtful proposition, why have spurious ghee ? But milk or butter milk we ought to have, no matter how little. Medical men say that it helps in the assimilation of the vegetable fats and proteins. Therefore ghee you can omit with impunity. I had recently two little children under my care whose diet I carefully regulated. I cut out ghee from it and found that they were none the worse for the cutting out of ghee. Of course I gave them as much milk as they wanted.

Our menu has cost us a little more than 6 pice. It was a full meal and the other meals need not be so heavy as this. They, therefore, need not cost more than an anna or so. Milk may be omitted for the other meals. Wheat *bhakhri,* soya bean and *chatni* should be quite enough.

Harijan, 2-11-1935

14

MINIMUM DIET

Use one grain at a time. *Chapati*, rice and pulses, milk, ghee, *gur* and oil are used in ordinary households besides vegetables and fruit. I regard this as an unhealthy combination. Those who get animal protein in the shape of milk, cheese, eggs or meat need not use pulses at all. The poor people get only vegetable protein. If the well-to-do give up pulses and oils, they set free these two essentials for the poor who get neither animal protein nor animal fat. Then the grain eaten should not be sloppy. Half the quantity suffices when it is eaten dry and not dipped in gravy. It is well to eat it with raw salads such as onion, carrot, radish, salad leaves, tomatoes. An ounce or two of salads serve the purpose of eight ounces of cooked vegetables. *Chapatis* or bread should not be eaten with milk. To begin with, one meal may be raw vegetables and *chapati* or bread, and the other cooked vegetables with milk or curds.

Sweet dishes should be eliminated altogether. Instead *gur* or sugar in small quantities may be taken with milk or bread or by itself.

Fresh fruit is good to eat, but only a little is necessary to give tone to the system. It is an expensive article, and an over-indulgence by the well-to-do has deprived the poor and the ailing of an article which they need much more than the well-to-do.

Any medical man who has studied the science of dietetics will certify that what I have suggested can do no harm to the body, on the contrary it must conduce to better health.

Harijan, 25-1-1942

15
PLEA FOR MORE FRUITS

Dr. Menkel, who is also a dietetist, comments as follows in *The Oriental Watchman* on my note * in *Harijan* of January 25th :

"First is the statement that food taken in excess of actual requirement for repair and energy is as much food actually wasted. Excess food is not only wasted food, but this excess also places a tax on the organs of digestion, detoxication and elimination, producing premature exhaustion with such developments as diabetes, nephritis and auto-intoxication. Another economy recommendation is that half the quantity of grain as wheat or rice will meet the food purposes when not taken in sloppy form. Cooked or baked grains when taken as near dry as possible must then be masticated and moistened with saliva to be swallowed. This results in better digestion and therefore less food providing the needed energy. Mr. Gandhi suggests that an ounce or two of raw salad vegetables is worth eight ounces of cooked vegetables. This applies particularly to their vitamin and mineral values. There is also something vital in raw fruit and vegetable which is destroyed by cooking. For this reason it is desirable that some uncooked raw fruit and vegetables be taken daily. India needs to make more extensive use of such raw uncooked foods. The elimination of sweet dishes as advocated would greatly relieve the stress upon the pancreas and liver imposed by the average Indian diet, and thus reduce the incidence of diabetes. It is in regard to Mr. Gandhi's statement about fruit that we do not find ourselves quite in agreement. He writes : 'Fresh fruit is good to eat, but only a little is necessary to give tone to the system.' While we can hobble along on low power with little fruit in the diet, it is the contrary that is required. Because so little fruit is available and consumed by the population, that there is so much vitamin and mineral deficiency in India. Writing about fruits and berries in his book *Food,* Sir Robert McCarrison states : 'They are among the best of all foodstuffs and *should form a considerable part of our daily diet.* They contain much mineral salts of the alkaline kind which keep the blood pure and prevent it becoming acid and sour. Fruits are most useful in keeping the bowels healthy and active.' (p. 88). Man's physical structure indicates that he is intended to be a frugivorous creature. His natural food, the food on which he can be at his best, is fruit, nuts, milk and the more

* A part of this note appears just previous to this chapter, as 14. *Minimum Diet* in this volume.

succulent vegetables. Cereals would be better introduced as additional rather than as basic to the diet because of their strongly acid-ash-forming tendency. On the other hand, as stated by Sir Robert McCarrison, the fruits and vegetables are rich in the alkali minerals. The importance of this difference will be recognized when it is recalled that most of our ailments and all our pains, except those due to accident, are of acid origin. Obviously there would be less pain, and more enjoyment of life, if we kept more definitely on the alkaline side. This necessitates more fruit and vegetables, with proportionately less of the acid-tending cereals. The normal proportion is four parts of the alkaline — fruit and vegetables — to one of acid, which includes all the other foods. This would be the diet of health economy, and should be made economically within the reach of all, in a well-organized world. Under existing emergency Mr. Gandhi has advocated a very rational and possible food economy. His suggestions merit careful study and application."

While I appreciate Dr. Menkel's endorsement of my remarks, I like better his correction of my apparent lukewarmness about fruit. No one perhaps, as far as I know, has eaten as much fruit as I have, having lived for six years on entirely fruits and nuts and always having had a liberal supply of fruit as part of my ordinary diet. But I had in my mind, when writing, the special conditions of India. Its people should have, by reason of its extent and variety of climate, a most liberal supply of fruits, vegetables and milk. Yet it is the poorest country in this respect. I therefore suggested what seemed to me to be feasible. But I heartily endorse the proposition that for retaining health fresh fruit and fresh vegetables should form the main part of our diet. It is for the medical profession to study the peculiar condition of India and suggest the list of vegetables and fruit which are or can be easily and cheaply grown in the villages for local consumption. Wild berries, for instance, grow abundantly. They may not be taken to the market for sale but can be used for the picking. This is a vast field for research. It can bring neither money nor perhaps fame. But it may earn the gratitude of dumb millions.

Sevagram, 28-2-'42

Harijan, 15-3-1942

16
CARRION - EATING

I

Dear Dr. Deshmukh :

I badly need your assistance in one or two things.

(1) Is there any chemical or physiological distinction between carrion and slaughtered meat ? If there is, what is it ?

(2) Do you know of any medical reason for the great repugnance that even meat-eaters have against carrion ?

(3) If you are of opinion that there is no difference between fresh carrion and slaughtered meat, can you say whether flesh or dead cattle treated two or three days after death or even 24 hours after death would make any difference ?

(4) You may know that some *Chamars* poison cattle for possessing the carcasses and they are said to eat their flesh. Will not the flesh of poisoned cattle affect the eater in any way ? Is the flesh not tainted by the poison, or are there any poisons which, while they kill the cattle, do not harm their flesh ?

Yours sincerely,

M. K. GANDHI

II

Dear Mahatmaji :

Between carrion of an healthy animal and slaughtered meat there is no chemical or physiological difference. I know this will come as a surprise to many, as the popular opinion is that there should be a difference, but from the scientific as well as medical point of view, there is none.

In the slaughter of animals, the animal bleeds and, nearly all the blood being drained away, the slaughtered meat contains less blood. In the case of carrion, all the

blood remains in the tissues of the animals and consequently the meat contains more blood.

Decomposition sets in in every dead animal, whether killed or dead naturally. This decomposition is liable to set in earlier in moist tissues and tissues containing more blood. The carrion, therefore, is liable to decompose earlier than slaughtered meat.

If the meat whether carrion or slaughtered is eaten before the decomposition sets in, it will be seen that this difference between the two vanishes at this stage. The larger quantity of blood in carrion might even be to the taste of a certain type of people.

You might possibly think that meat, when it starts decomposing, is universally rejected by human beings as food. It is not only the depressed classes of our country who partake of decomposing meat, but this practice is not uncommon in other parts of the world. Gypsies in Europe have been known to be fond of this practice; they go to the extent of even disinterring the dead carcasses of buried animals for food purposes. Decomposing fish is estimated to be an article of diet of more than three hundred millions of human beings in the world. It is not even a matter of poverty or ignorance. Certain persons of superior taste make a point of decomposing meat before eating, to pander to their epicurean taste.

DISEASED MEAT: — But all this is in the case of healthy animals. This cannot hold good in the case of diseased animals. Many epidemics of meat poisoning have occurred in the West which have been proved to be due to eating of meat from diseased animals, and the diseases in animals which lead to poisoning are not the prominent diseases in cattle which kill them, such as *Anthrax* and *Glanders*, but common, pus-producing diseases which do not attract so much attention in life. Hence the necessity of meat inspection in all civilized countries. In Indian villages where this practice of eating carcasses is more common, it will be seen how dangerous this practice is likely to be, on account of animals dying of diseases to

which no importance is attached but which are particularly dangerous to human beings.

I do not believe in the economic reason of eating dead carcasses. After all, in villages, animals do not die daily and the carrion forms a very insignificant part of the supply of food — an occasional variety or luxury, if it can be so called. Besides, the lower labouring classes in villages are in no better position economically than the depressed classes, and yet they can do without eating carrion.

On account of the excess of blood in carrion, carrion not only decomposes earlier but is also difficult to preserve. Decomposition is liable to set in earlier than even 24 hours in a hot climate like ours. So, although treated, carrion meat is not so wholesome as slaughtered meat as food.

POISONED MEAT : — The meat of poisoned cattle is not poisonous to eat. This is another surprise. This charge of poisoning cattle has been brought against the depressed classes from time immemorial — from the Vedic times. I think it may be true, and may partly explain the hostility of the agricultural *Aryan* against the *Dasyu* who destroyed his agricultural wealth. You know how fond the Vedic population was of their cows and cowpens and bulls and heifers. Poison is used by the Red Indians of America, also the Akas Tribe near Brahmaputra, in hunting for food with poisoned arrows, but the meat of this poisoned animal is eaten by them without any detriment to health.

Probably the poison used in India is strychnine (*Kuchala*) for killing cattle, but the meat of the dead animal is not poisonous to eat. Experiments have been carried on animals, such as dogs, by feeding them on poisoned meat of the animal killed by vegetable poison such as strychnine, escerine, pilocarpine, veratrine and mineral poisons such as arsenic and antimony ; and meat in all these cases has proved to be harmless. The explanation is that, although the poison is strong enough to kill the animal, the poison is further oxidised into a harmless product and the meat, therefore, remains harmless. In

the case of mineral poisons and caustics, very little is absorbed into the system of animals and the meat, therefore, contains very little of the mineral poison. Meat of poisoned animals, therefore, is harmless for eating purposes.

QUESTION OF REPUGNANCE :—I now come to the most difficult of your questions, as to why there is such repugnance against those who eat carrion. That there is such a feeling of repugnance, not only in India but all the world over, cannot be denied. Logically if there is not much difference between the carrion of an healthy animal and slaughtered meat, such repugnance should not exist; and if the repugnance is to exist, it should then extend to all meat eaters. The answer to this question might have been difficult before the advent of the science of Analytical Psychology of Frued and Jung. In the light of this science an adequate explanation can be given. The explanation lies in the fundamental property of the human mind of Displacement and Transference (Verdraengung and Verschiebung). Everything which is not killed but dead, decomposing and putrefying excites a feeling of fright, aversion or repugnance in the human mind. This instinct of repugnance is as necessary for Race Preservation as other instincts; otherwise, this human animal would have died of dirt long ago and have been extinct by now. If the dead carcass instead is used for food or alimentation, which is one of the two fundamental necessities of life, it can be imagined why so much loathing is attached to this practice. The feeling of repugnance gets displaced from the act to the person who does it. Economics, Logic or Science does not seem to me to be capable of annulling this faculty of displacement of the human mind. It is a psychological fact, in the same way as the flowing of water or rotation of the Earth is a physical fact; as such, use of carrion for good in normal times is bound to create a feeling of loathing in the human mind, and a feeling of repugnance for the human being who practises this.

The displacement is from the act to the subject. The conclusion is plain : This practice must disappear. Our depressed class brethren must give it up. Universal human psychology is against it and, therefore, it must go.

Yours sincerely,
G. V. DESHMUKH

Harijan, 8-4-1933

SECTION II : RICE, WHEAT AND GUR

17

POLISHED v. UNPOLISHED

If rice can be pounded in the villages after the old fashion the wages will fill the pockets of the rice pounding sisters and the rice eating millions will get some sustenance from the unpolished rice instead of pure starch which the polished rice provides. Human greed, which takes no count of the health or the wealth of the people who come under its heels, is responsible for the hideous rice-mills one sees in all the rice-producing tracts. If public opinion was strong, it will make rice-mills an impossibility by simply insisting on unpolished rice and appealing to the owners of rice-mills to stop a traffic that undermines the health of a whole nation and robs the poor people of an honest means of livelihood.

But who will listen to the testimony of a mere layman on the question of food values? I, therefore, give below an extract from *The Newer Knowledge of Nutrition* by Mr. Collum and Simmonds which a medical friend, to whom I had appealed for help has sent with his approbation.

> "Rice is the most important cereal grain in the diet of more than half of the human race. It is used especially in the wettest parts of the World. It has never found much favour in the United States but is used in small amounts. Among primitive peoples rice is eaten without polishing, in which form it is known as red rice, but it is usually treated so as to lose a large part of its germ. This loss results from the pounding of the kernels in rude mortars. The bran layer, which is richer in mineral salts and the endosperm of the seed, is retained in this process.

"Rice which is used for export and for sale in the large cities at some distance from the place of production is polished by abrasion. The abrasive action results in wearing away the bran and germ. This mixture is known as rice polishings. The germ of rice, like that of wheat or maize, consists of cellular structures which are the seat of protoplasmic activity, and is a more complete food than any other part of the kernel. It contains almost all the fats found in the grain, and is more efficient in nourishing insects as well as higher animals, than is the polished grain. Hamada (1923) reports that rice embryo protein has a high nutritive value. Unpolished rice loses its flavour owing to the fats becoming rancid when kept for considerable periods in a warm climate. Polished rice can be handled without commercial hazard.

"McCarrison (1923) concluded that vitamin A is present in paddy before it is milled. The milling of raw paddy does not remove the whole content of this substance as it is not confined to the peripheral layers of the grain. He states that it is destroyed in great measure by steam passing through paddy when it is contained in the vats, as in parboiling.

"The practice of polishing rice had its origin in the desire to improve its keeping quality, and the incidental whitening of the kernels has led to the establishment of a demand for a white product. This and the artificially established liking for white flour and white corn meal, is an illustration of the failure of the instinct of man to serve as a safe guide in the selection of food. The aesthetic sense is appealed to in greatest measure in this case by the products of lowest biologic values.

"Attractiveness of rice to the eye is so important a factor commercially that the practice of artificial whitening of the polished kernels has come into vogue. This is accompanied by coating the kernels with talcum powder, the latter adhering by means of a thin coating of glucose. The milky appearance of the water in which rice is washed is due to the talcum remaining in suspension. Rice which has been polished, but not coated in this way, is called brown rice as contrasted with the coated or white rice.

"Chart III shows that there are four dietary factors in which polished rice is of such poor quality as to require improvements before it becomes a complete food. Its proteins are of low value. It is too poor in all essential mineral elements to meet the needs of a growing animal, and is nearly free from Vitamins A and B. The data in Chart III were obtained with the rats and do not bring out the fact that rice is lacking in the vitamin C. This substance is not essential in the diet of the rat.

"Kennedy (1924) found wild rice to contain a higher percentage of protein than most other cereals, but it resembles the cereals in containing proteins of rather low biological value. It also resembles other cereals in containing inorganic material unsuitable for the promotion of growth. Its content of vitamin A is low but it contains a sufficient amount to prevent xerophthalmia. Wild rice has a greater food value than the cultivated polished rice, because its proteins are of better quality. It contains adequate amounts of vitamin B for growth."

Harijan, 26-10-1934

18

RICE, WHEAT AND GUR

Dr. Ansari's is the latest reasoned opinion received on unpolished rice, whole wheatmeal and *gur*. I share it with the readers.

"Of all cereals, rice is the richest in starch, of which it has nearly 50 p.c.; the starch in rice has the further advantage of being present in small and easily digestible grains. When boiled, rice swells up and absorbs nearly five times its weight of water, while some of its mineral and other constituents are lost in the process of boiling. But the most important ingredient lost in this process of boiling is the water-soluble Vitamin B. In the process of polishing rice, all outer coverings of the grains are removed, consisting of the husk as well as the pigmented covering containing Vitamin B, Fat and Protein, which are necessary for health and growth. It has been proved that the absence of Vitamin B from polished rice has been instrumental in causing Beri-Beri. Unpolished rice, on the other hand, not being subjected to the boiling process used in polishing rice in the mills, retains Vitamin B as well as the Protein, Fat and mineral matter in which rice is none too rich. The unpolished rice, hand-pounded, is superior to the unpolished rice turned from the mills, in so far as the former is not subjected to the heating process, even though it is dry-heating which it has to undergo in the mills.

"Wheat is the most important of cereal foods in India. The wheat grain consists of bran or outer envelop, mainly composed of cellulose, the kernel consisting of starch and the germ consisting of soluble starch, protein and some fat. According to

Professor Church, a whole wheat grain has the following composition:

Water	Nitrogenous matter	Fat	Starch & Sugar	Cellulose	Mineral matter
14·5%	11%	1·2%	69%	2·6%	1·7%

In the process of milling, the germ and the bran are rejected, and with it undoubtedly are discarded some of the most useful chemical constituents of the wheat, for, with the germ a considerable amount of protein and fat are lost, and with the bran are lost mineral matter as well as some protein. The recognition of this has led to some process during milling to prevent it, but the wheatmeal ground in the mills is never so rich in these ingredients as the whole wheatmeal flour ground in the indigenous *chakki*. The latter consists of all the three ingredients, i.e., the bran, the kernal and the germ and is hence superior in nutritive value, besides being cheaper and more readily available to the poor people in the countryside.

"*Gur*, Jaggery or molass is produced as by-product in the manufacture of crystallized sugar. The juice from the sugarcane is cooked in a big pan, the water being allowed to evaporate, and a dark-brown syrupy substance is thus produced which contains crystallizible cane-sugar, uncrystallizible fruit-sugar and some impurities and colouring matter. The following are their composition:

Cane Sugar	Fruit Sugar	Extraneous and colouring matter	Salts	Water
47%	20%	2·7%	2·6%	27·3%

"Refined crystalline cane-sugar, or Sucrose, is the most familiar of all kinds of sugar. It is chemically indistinguishable from sugar derived from beetroot, maple, etc. Sucrose is assimilated in the process of digestion, only after it has been inverted by ferments and acid secretions of the stomach. It is then stored up in the liver as glycogen. On the other hand, fruit-sugar is already to be assimilated into glycogen. It is, therefore, clear that crystalline or refined cane-sugar and *gur*, taken quantity for quantity would take different times in their assimilation. *Gur*, consisting of cane-sugar and fruit-sugar in the proportion of 2 to 1, would be assimilated more rapidly than cane-sugar alone taken in the same quantity. Therefore, the nutritive value of *gur* is at least 33 p.c. superior to that of refined sugar."

The truth of the opinion can be tested by everybody for himself by trying pure *gur*, *chakki*-ground whole wheatmeal and hand-pounded unpolished rice.

Harijan, 28-12-1934

19

UNPOLISHED RICE

The following is the result of my observations to date.

Whole, unpolished rice is unprocurable in the bazars. It is beautiful to look at and rich and sweet to the taste. Mills can never compete with this unpolished rice. It is husked in a simple manner. Most of the paddy can be husked in a light *chakki* without difficulty. There are some varieties the husk of which is not separated by grinding. The best way of treating such paddy is to boil it first and then separate the chaff from the grain. This rice, it is said, is most nutritious and, naturally, the cheapest. In the villages, if they husk their own paddy, it must always be cheaper for the peasants than the corresponding mill-husked rice, whether polished or unpolished. The majority of rice, found ordinarily in the bazars is always more or less polished, whether hand-husked or mill-husked. Wholly unpolished rice is always hand-husked and is every time cheaper than the mill-husked rice, the variety being the same.

Subject to further research, the observations so far show that it is because of our criminal negligence that rice-eating millions eat deteriorated rice and pay a heavy price into the bargain. Let the village worker test the truth of these observations for himself.

Harijan, 25-1-1935

20

WHEAT AND GUR

Last week I dealt with rice. Let us now take up wheat. It is the second most important article of diet, if not the first. From the nutritive standpoint, it is the king of cereals. By itself, it is more perfect than rice. Flour bereft of the valuable bran is like polished rice. That branless flour is as bad as polished rice is the universal testimony of medical men. Whole-wheat flour ground in one's own *chakki* is any day superior to, and cheaper than, the fine flour to be had in the bazars. It is cheaper because the cost of grinding is saved. Again, in whole-wheat flour there is no loss of weight. In fine flour there is loss of weight. The richest part of wheat is contained in its bran. There is a terrible loss of nutrition when the bran of wheat is removed. The villagers and others who eat whole-wheat flour ground in their own *chakkis* save their money and, what is more important, their health. A large part of the millions that flour-mills make will remain in and circulate among the deserving poor when village grinding is revived.

But the objection is taken that *chakki* grinding is a tedious process, that often wheat is indifferently ground and that it does not pay the villagers to grind wheat themselves. If it paid the villagers formerly to grind their own corn, surely the advent of flour-mills should make no difference. They may not plead want of time, and when intelligence is allied to labour, there is every hope of improvement in the *chakki*. The argument of indifferent grinding can have no practical value. If the *chakki* was such an indifferent grinder, it could not have stood the test of time immemorial. But to obviate the risk of using indifferently ground whole-wheat flour, I suggest that, wherever there is suspicion, the flour of uneven grinding may be passed through a sieve and the contents may be

turned into thick porridge and eaten with or after *chapati*. If this plan is followed, grinding becomes incredibly simple, and much time and labour can be saved.

All this change can only be brought about by some previous preparation on the part of workers and instruction of villagers. This is a thankless task. But it is worth doing, if the villagers are to live in health and elementary comfort.

Gur is the next article that demands attention. According to the medical testimony I have reproduced in these columns, *gur* is any day superior to refined sugar in food value, and if the villagers cease to make *gur* as they are already beginning to do, they will be deprived of an important food adjunct for their children. They may do without *gur* themselves, but their children cannot without undermining their stamina. *Gur* is superior to bazar sweets and to refined sugar. Retention of *gur* and its use by the people in general means several crores of rupees retained by the villagers.

But some workers maintain that *gur* does not pay the cost of production. The growers who need money against their crops cannot afford to wait till they have turned cane-juice into *gur* and disposed of it. Though I have testimony to the contrary, too, this argument is not without force. I have no ready-made answer for it. There must be something radically wrong when an article of use, made in the place where also its raw material is grown, does not pay the cost of labour. This is a subject that demands local investigation in each case. Workers must not take the answer of villagers and despair of a remedy. National growth, identification of cities with villages, depend upon the solution of such knotty problems as are presented by *gur*. We must make up our mind that *gur* must not disappear from the villages, even if it means an additional pice to be paid for it by city people.

Harijan, 1-2-1935

21

ALL ABOUT RICE

The problem of rice is daily presenting interesting features. Shri Shankarlal Banker has already commenced experiments on unpolished rice. He writes:

> "When formerly paddy was hand-husked, it underwent three polishes after the removal of the outermost husk, and many people indeed believe even now that that process has to be gone through. I therefore had some paddy got and, after removing the husk, had three polishes by pounding once, twice and thrice, of which specimens are being herewith sent. The rice that was only once polished was much sweeter to the taste than that which was polished twice and thrice. The first process of removing the husk was gone through by means of the *chakki*, and the polishing or pounding was done by using the village pestle and mortar. The rice which was obtained by merely removing the husk was in colour almost like that which was first polished. But it took a longer time to cook. The next time, therefore, I soaked the rice in water for some time, and there was no difficulty about cooking. The sweetness was all the greater. Some contend that rice that is not polished at all is difficult to digest. But this is not likely. The part that is removed by polishing contains vitamins and salts, which help digestion. If, however, this belief is not well-founded, you will perhaps procure authentic information. You will be interested to know that on removing the mere husk from 10 seers of paddy it was reduced to 7½ seers. Thus the weight was reduced by 25 per cent. On polishing three times it was reduced to 40 per cent. The paddy that I used for my observation was the variety called *jirasal*."

The only comment I would like to offer on this letter is that I do not think that any further medical opinion will help. The opinion I have gathered and reproduced in these columns is emphatic in favour of unpolished rice. But so far as I am aware, we have nothing in medical literature describing experiments of which Shri Banker has, like many of us, made the commencement. Proof of the pudding is in the eating; let everyone make the experiment for himself.

One caution, however, as a practised cook I would like to utter. Among the many domestic quarrels I used to have with my wife was one over rice-cooking. She would have every grain separated. I had developed into a dietetic reformer and I knew that that rice was not half as good as that which was well and properly cooked. Not an ounce of water in which I cooked rice was thrown away. But at that time I knew no distinction between polished and unpolished rice. I simply took the ordinary bazar rice and cooked it through till it became one mass. The reader will be glad to know that the quarrel ended in a victory for the reform, and the wife became a convert to properly cooked rice. The precaution about unpolished rice is all the more necessary, because the pericarp of rice, which contains all its richer constituents, requires to be cooked thoroughly. Therefore, if unpolished rice is soaked in cold water for at least three hours before cooking, and then well boiled, there is not only no danger of its proving undigestible, but it will be decidedly more palatable, as has already been found at Maganwadi, the abode of the Village Industries Association in Wardha. We have been having here what may be called half-polished rice, not the perfect variety that is described in the foregoing letter. Nevertheless, the rice is well cooked. Nobody has complained about its indigestibility. But, being far more nutritious than polished rice, which is almost pure starch, naturally unpolished rice, cannot be, and must not be, eaten in the same quantity as polished rice. This is true of all conservative cookery.

Harijan, 15-2-1935

22

WASTE INTO WEALTH

Those who have been following what is being written in these columns on balanced diet will not have failed to understand the vast importance of bran which we simply throw away and give to our cattle. I do not grudge the cattle what they get. But it seems to me that we are thoughtless about cattle-feeding as about many other things. Cattle do not need bran so much as green fodder and seed cakes which they can easily divide with us if we will revert to the village oil-presses. But we need every ounce of the bran of wheat and rice if we are to become efficient instruments of production, not to be beaten on this earth by any race, and yet without the necessity of entering into killing competition or literally killing one another. But I must not prolong what is becoming a heavy preface to a simple recipe which a friend has passed on to me for treating wheat bran. He is obliged to his sister for it. Here it is :

Grind sufficient wheat coarse to give you one pound of bran which you get by passing the meal through a medium sieve. Add 1¼ lb. of cold water, eight tolas of pulverized clean *gur* and half a tea-spoonful of clean salt to the bran and stir well. Pour the mixture in a flat vessel, cover and let it stand for full half hour. Then put a well-fitting *tava* or dish on the pot containing the mixture and stand it on hot coal and heap hot coals on top. Keep the pot between the two fires for full five minutes. Then transfer the mixture on to an iron *kadai* and roast on a slow fire till the water is fairly dried out. Then take the pot off the *chula* and let the contents cool. Then strain them through a sieve with clean hands and the contents will drop on a clean cloth or board in the form of threads. Expose these to the sun till thoroughly dry. These can be taken as they are or with hot or cold milk or hot water or

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whey. Two ounces will make a good breakfast and is claimed to be a valuable aid to remove constipation — the bane of civilized life and precursor of many diseases.

Harijan, 12-10-1935

SECTION III: SOYA BEANS AND GROUNDNUTS

23

SOYA BEANS

As soya beans are claimed to possess high nutritive value I reproduce the following from pamphlet No. 7 published by the Bombay Presidency Baby and Health Week Association to enable the food reformer to make experiments:

"Generally speaking, yellow beans are the richest in protein and fat, especially in the latter; then come green beans, with black beans last. Farmers in any part of the world who take up the cultivation of the soya beans should therefore grow the yellow beans in preference to others.

"The soya bean is one of the most important articles of diet. It contains far more proteins than any grain or pulse seed known so far. It has as much as 40 per cent proteins, i.e. 2 times more than in pulses and beans, 3 times more than in wheat, and 5 times more than in rice.

"Its proteins are of high biological value as they contain all the important Amino-Acids; particularly, Glycine, Trypto-phane and Lycine. In fact, the protein of soya beans is similar to that found in cow's milk and animal foods. It is a boon to vegetarians as its protein resembles animal protein. Soya bean oil contains a large amount of Lecithin and Vitamin A & D, and in this respect it resembles butter. Lecithin of soya beans is identical with that of yolk of eggs.

"Soya bean is one of the few seeds containing three Vitamins A, B & D, which are indispensable in a staple food consumed by mankind.

"The mineral salts in soya beans are far more than in many other seeds and they consist mostly of phosphates and calcium. It can therefore be used to great advantage for the cure of nervous diseases.

"Soya beans are on account of their low starchy content (only 24 per cent) very important in the dietary of diabetic patients. Modern researches in diabetic dietary recognize the

importance of a carbohydrate equivalent containing starch in small proportion. Soya beans fulfil this condition.

"To prepare soya bean coffee the beans are roasted like coffee beans and ground to a fine powder for use.

Soya Bean Milk

"The straw-yellow or yellowish-green seeded varieties of soya beans are always used in the manufacture of vegetable milk. The bean pulse should be soaked in water for several hours. This soaking causes the pulse to swell up and is said to facilitate the extraction of the bean proteids. It is then crushed on a stone slab or ground through a native mill which consists of two pieces of flat circular stones, one on top of the other.

"The crushed mass is strained through a cloth, diluted with water (usually three times the amount of water as there is of bean material) and boiled. After boiling, it is again strained and the white milk run off into containers.

"The flour of soya bean pulse can be used in the same manner and gives fully as good results as the above method. It is a rather convenient method of preparing the milk as it involves less labour and greatly reduces the amount of time. The flour is added to the boiling water and the mixture boiled for ten minutes stirring constantly. Experiments with the different methods of preparing the milk have shown that as much bean curd can be obtained by use of the flour as with soaking the pulse and crushing, the latter being the method used in the Orient. After the flour and water are boiled, the mixture is strained through a cloth. If a more concentrated milk is desired, the proportion of water may be reduced.

Soya Bean Flour

"The soya beans are dried in the sun for two days. It becomes now easy to make its pulse. All the small particles of the pulse should be included in the pulse and *only the thin husk should be thrown away.* This pulse should be mixed with rice or wheat or *bajri* in the proportion of one part of soya pulse to 6 or 8 parts of other grains for the preparation of *rotis* or [illegible] in the usual way.

"The soya bean is not generally used by itself but as an addition to other foods. Our food then becomes richer in proteins, fats and salts which is a great advantage to vegetarians."

Harijan, 28-9-1935

24
SOYA BEANS

It has been found that soya beans can be cooked whole and eaten like any other beans. Shri Narhar Bhave of Baroda, who has given his three gifted and gentle sons, Vinoba, Balkrishna and Shivaji to national service, is himself a careful observer, 61 years old. He is living almost wholly on milk and 6 ounces of soya beans and is keeping perfect health and strength. He is of opinion that soya beans help him to avoid constipation which milk alone or milk taken in combination with cereals and vegetables could not do. Soya beans have in his opinion helped him also to avoid flatulence which other pulses or milk produced. He has come to this conclusion after an unbroken experience of over ten months. I may add that Shri Bhave used to suffer from gout and corpulence and had a trace of diabetes. He got rid of this triple disability by mere careful dieting. In imitation of Shri Bhave the inmates of Maganwadi including me have been trying soya beans for the last few days. It is too early yet to pronounce any opinion for ourselves. Each inmate gets a heaped dessert spoonful per day. This is how the beans are cooked. Clean the beans of foreign particles or dirt, wash in cold water and soak at least for twelve hours, and not more than eighteen, and drain off superfluous water. Put these beans in boiling water and cook for fifteen minutes on a quick fire. No salt or soda to be added while cooking. Salt may be added after. At Maganwadi we steam them for two hours.

Let those who are interested in food reform from the poor man's point of view, try the experiment. It should be remembered that soya beans are a most nutritious diet. It stands at the top of all the known articles of diet because of its low percentage of carbohydrates and high percentage of salts, protein and fat. Its energy value is

2,100 calories per lb. against 1,750 of wheat and 1,530 of gram. It contains 40 per cent of protein and 20.3 per cent of fat against 19 and 4.3 respectively of gram and 14.8 and 10.5 of eggs. Therefore no one should take soya beans in addition to the usual protein and fatty foods. The quantity, therefore, of wheat and ghee should be reduced and *dal* omitted altogether, soya beans being themselves a highly nutritious *dal*.

Harijan, 19-10-1935

25

SOYA BEANS

Inquiries are being made as to where soya beans are to be had and how they are to be sown and in what ways they are to be cooked.

The leaflet published by the Bombay Health Association was condensed in these columns only recently. I now give below a free translation of the main parts of a Gujarati leaflet published by the Baroda State Food Survey Office. Its cost is one pice :

"Soya beans grow on a plant from one foot to fifteen inches in height. Every pod has on an average three beans. The plant has many varieties. The bean may be white, yellow, blackish, variegated, etc. The yellow variety has the largest percentage of protein and fat. This variety is more nutritious than meat or eggs. The Chinese eat beans with rice. Soya beans flour may be mixed with ordinary flour in the proportion of 1 to 5 parts of wheat and turned into *chapaties*.

" Soya bean crop improves the soil. Instead of deriving nitrogen like other plants from the soil, soya bean derives it from the air and thus enriches the soil.

" Soya bean grows in practically all soils. It thrives most in soils favourable to cotton or grain crops. Salt soil improves if soya bean is sown in it. In such soil more manure should be used. Fermented cowdung, grass, leaves and dungheap manure are quite serviceable for this crop.

" Temperate climate suits the bean. It thrives where the rainfall is not more than 40 inches. It should not be sown in water-logged soil. The bean is generally sown after the first rains,

but it can be sown during any season. In the dry season it requires to be watered once a week, or twice if the soil is inclined to dry quickly.

" The soil is best prepared in summer. It should be ploughed up and exposed to the sun's rays. Then the clods should be broken up and pulverized.

" The seed should be sown in rows twentyfour to thirtysix inches apart. The plants should be three or four inches apart in their rows. There should be frequent weeding. One acre would take from 20 to 30 lb. of seeds. They should not be sown deeper than two inches. One acre will require about 10 cartloads of manure. After the sprouting of the seeds there should be proper weeding with a light plough. All crust should be broken up.

" The pods are ready for picking in 120 days after sowing. They should be picked as soon as the leaves begin to turn yellow and drop off. They should not be allowed to be on the plants till they open, or else the seeds will drop out and be lost in the soil."

So much for the crop.

Now a word as to the results of the experiment being made in Maganwadi.

It is too early to draw deductions as yet. It may be said that the weight of the inmates has kept constant. In a few cases there has been a decided increase — in one case as much as 4½ lb. in a fortnight. Ghee has been stopped since the close of the first week. The absence of it has yet made no impression on the weight. One ounce of oil is being issued instead. The ration of beans has been increased for the current week from two ounces to three per head. The bean is served both morning and evening. They are soaked for some hours and then cooked well. Water in which it is steamed is strained out and tamarind and salt added to it. It makes a very popular soup. To the beans after straining are added linseed or *til* oil and salt making a tasty dish. In the morning the bean is served with *chapati* or *bhakhri* and in the evening with rice. The bean requires to be chewed well. No ill effect has yet been reported.

Harijan, 9-11-1935

26

IN PRAISE OF GROUNDNUT CAKE

[A friend sends the following opinion of Prof. D. L. Sahasrabudhe, in praise of groundnut cake. It certainly deserves a trial.

—M. K. G.]

There is a good deal of preaching done to encourage the use of soya beans as a food material, while groundnut which is extensively grown in India is not given the consideration it deserves. Groundnut is a very valuable oilseed and food material. Groundnut itself is not easy for digestion and many times causes digestive disturbances. This is, however, due to the presence of a very high proportion of oil—50 per cent. If the oil is extracted from well cleaned seed, the oilcake left behind is a highly nutritious food material for human consumption and does not cause any trouble. The following is the average analysis of groundnut cake and soya beans.

	Groundnut cake per cent	Soya beans per cent
Moisture	8	8
Proteids	49	43
Carbohydrates	24	19.5
Fat	10	20
Fibre	4	5
Mineral matter	5	4.5

The groundnut cake compares very favourably with the soya beans. It is actually better than soya beans in the essential constituents, namely the proteids and the mineral matter. Further, the groundnut proteid is better than soya bean proteid in essential amino-acids as shown by the following figures:

Essential Amino-acids	Groundnut Proteids per cent	Soya bean Proteids per cent
Tyrodine	5.5	1.86
Agrinine	13.5	5.12
Histidine	1.88	1.39
Lysine	5.50	2.71
Eystine	0.85	—

If at all any biliousness is caused by groundnut cake, use of a small quantity of jaggery or a little soda-bi-carb will be a good preventive.

The groundnut cake has a very good taste and its keeping quality can be improved by heating and keeping the cake in a properly closed vessel.

Sweets and ordinary articles of food can be prepared from groundnut cake. Attempts must, therefore, be made to spread the knowledge about the usefulness of groundnut cake. It is certainly equal to and even better than soya beans.

Harijan, 14-12-1935

SECTION IV: GREEN LEAVES, ETC.

27

GREEN LEAVES

Take up any modern text-book on food or vitamins, and you would find in it a strong recommendation to take a few edible green leaves uncooked at every meal. Of course, these should always be well washed half a dozen times to remove all dirt. These leaves are to be had in every village for the trouble of picking. And yet greens are supposed to be only a delicacy of cities. Villagers in many parts of India live on *dal* and rice or *roti*, and plenty of chillies, which harm the system. Since the economic re-organization of villages has been commenced with food reform, it is necessary to find out the simplest and cheapest foods that would enable villagers to regain lost health. The addition of green leaves to their meals will enable villagers to avoid many diseases from which they are now suffering. The villagers' food is deficient in vitamins; many of them can be supplied by fresh green leaves. An eminent English doctor told me in Delhi that a proper use of green leaves was calculated to revolutionize the customary notions of food and that much of what was today being supplied by milk might be supplied by green leaves. That, of course, means elaborate research and examination in detail of the nourishing properties of the innumerable leaves that are to be found hidden among the grasses that grow wild in India.

For nearly five months I have been living entirely on uncooked foods. I used to take what appeared to me an enormous quantity of a vegetable every day. For the past five months I have been taking green leaves in the place of cooked leaves or other vegetable. It then seemed to me monstrous that I should have to depend upon the Wardha bazar for the few ounces of leaves I needed. One

fine morning Sjt. Chhotelalji of the Wardha Ashram brought to me a leaf that was growing wild among the Ashram grasses. It was *Luni.* I tried it, and it agreed with me. Another day he brought *Chakwat.* That also agreed.

Since these were received, I had introduced to me the leaves of *sarsav, suva,* turnip-tops, carrot-tops, radish-tops and pea-plant leaves. Besides these, it is hardly necessary to state that the radish, turnip and carrot tubers are also known to be edible in their raw state. It is waste of money and 'good' taste to cook these leaves or tubers. The vitamins contained in these vegetables are wholly or partially lost in cooking. I have called cooking these waste of 'good' taste, because the uncooked vegetables have a natural good taste of their own which is destroyed by cooking.

Harijan, 15-2-1935

28

NEEM LEAVES AND TAMARIND

In answer to certain questions Dr. Aykroyd, Director of Nutrition Research, sends the following interesting replies:

"You ask about food values. Data on this point are being rapidly gathered here and elsewhere in India, and I hope that at no very distant period an authoritative book or pamphlet giving the chemical composition, vitamin potency, etc., of all common foods will become available for those interested in dietetics. I have little doubt that you are right in stating that in practice different vegetable fats and oils produce different physiological effects. This is probably due to their chemical make-up, but unfortunately we are not yet in a position to correlate chemical composition and dietary effect in this case. In all probability some research worker somewhere in the world will soon enlighten us.

"We have analysed neem leaves in the laboratory. As compared with a number of other green vegetables previously investigated, they have a high nutritive value. Both mature and tender leaves are rich in protein, calcium, iron and vitamin A

activity and are superior in these respects to amaranth leaves, corriander leaves, and spinach. This perhaps explains the tradition of their high nutritive value. I believe that modern laboratory investigations in China have not infrequently demonstrated that herbs and other types of food recommended in ancient Chinese books are rich in vitamins, etc.

"With regard to vitamin content, tamarind and lemon are roughly similar, except that the latter is richer in the anti-scorbutic vitamin C. Tamarind pulp, unlike lemon, contains a good deal of tartaric acid — about 14 per cent; the chief acid in lemon is citric acid. Otherwise the two fruits resemble each other in food value. Tamarind is stated to contain a laxative principle. I can offer nothing in support of the popular belief that it induces fever and rheumatism."

The reader should know that I have been making extensive experiments in *neem* leaves and tamarind. *Neem* leaves have been taken with impunity by several. My difficulty has been to make them palatable. Taken in the form of *chatni* containing sufficient tamarind pulp and salt, or lemon and salt, it is least objectionable. Some take two to three tolas of whole leaves with relish. I am unable to say definitely what effect the taking of leaves produces on the system. I have been tempting volunteers to try them because of the high merit attributed in Ayurveda to them and because of their decidedly good effect on Shri Bhansali. Their common use would enable the poor people without extra cost to take the green leaves upon which modern diet experts lay much stress. That the use of the leaf produces no ill effect can be stated with perfect confidence.

Of the good effect of tamarind I can write with equal confidence. One ounce of pulp taken with meals has in several cases induced free movement of bowels. It can be mixed with vegetables or rice or *dal*. It can be eaten as jam when mixed with sufficient quantity of *gur*. I have used it with beneficial effect for reducing fevers by giving it in the form of tamarind water. In no case have I found it to have induced cold or rheumatism or boils as many people believe it does. There is hardly a man or woman in the south who does not eat tamarind in some shape or form. It is the base for its famous *rasam*.

Village workers will have to find out cheap, effective and harmless substitutes for the expensive yet useful articles one uses in cities and which one cannot get in the villages for love or money. Tamarind and *neem* leaf are such substitutes.

Harijan, 16-11-1935

29

NEED FOR CARE

Apropos of my reproduction of Dr. Aykroyd's letter on *neem* leaves and tamarind, the reader will appreciate the following further letter from the Director of Nutrition Research. —M. K. G.

"1. I think there is a certain danger in publishing small items of dietetic knowledge apart, as it were, from their scientific context. Ignorant readers are apt to make faulty interpretations. For example, on re-reading the paragraph in my letter of November 6th relating to *neem* leaves, which you wish to publish in your paper, I think it might possibly give the impression that everyone should consume great quantities of this vegetable as a cure for all human ills. Actually, the small series of analyses we have carried out to date show *neem* leaves to be somewhat richer in certain food factors than a number of other leafy vegetables, but it is only a question of degree. In a word, it would be better, for purposes of popular education, to stress the value of all green leafy vegetables rather than to single out one particular vegetable for special commendation. I should therefore prefer the paragraph, which refers to the bitter variety of *neem* leaves (*Azadirachta Indica*) to read as follows:

Question: What is the nutritive value of *neem* leaves?

Answer: '*Neem* leaves resemble other green leafy vegetables in composition. Both mature and tender leaves are richer in protein, calcium, iron and carotene than amaranth leaves, coriander leaves, drumstick leaves, lettuce, murraya leaves, and spinach. Their composition makes them valuable as a supplement to a diet largely composed of cereals, and in this respect they resemble the leafy vegetables in general.'

I append a table giving, as requested, the chemical composition of *neem* leaves, as far as we have studied it.

Composition of *neem* leaves (*Azadirachta Indica*).

	Thick and mature leaves	Very tender leaves
	grammes per 100 grammes	grammes per 100 grammes
Moisture	59.44	59.36
Crude proteins	7.09	11.56
Ether extractives (commonly designated fat)	1.04	2.97
Mineral matter	3.36	2.61
Carbohydrates (by difference)	29.07	23.50
Calcium	1.07	0.127
Phosphorus	0.056	0.189
Iron	0.039	0.030
Calorific value per 100 grammes	154.0 calories	167.0 calories
Carotene content	45.6 * y per gram	—

2. The paragraph relating to tamarind and lemon might be modified as follows :

COMPOSITION OF TAMARIND AS COMPARED TO THAT OF LEMON

'With regard to vitamin content tamarind and lemon are roughly similar except that the latter is richer in the antiscorbutic vitamin C. Tamarind pulp, unlike lemon, contains a good deal of tartaric acid — about 14 per cent; the chief acid in lemon is citric acid. Fresh tamarind, which is more solid than fresh lemon, contains a somewhat higher percentage of protein, carbohydrate, and minerals than lemon; in the dried state tamarind yields about 3 per cent protein and 73.00 per cent carbohydrate (by difference). Tamarind is stated to contain a laxative principle. I can offer nothing in support of the popular belief that it induces fever and rheumatism.'

3.	Colocasia	in Hindi	= Arbi
	do. Perennial	"	= Bathu
	Amaranth Gangeticus	"	= Palack
	Prickly amaranth	"	= Karund

The botanical name of non-bitter flavouring *neem* is *Murraya konigii*. In Urdu = Karepak."

Harijan, 30-11-1935

* y 1. gamma (y) = .001 milligram or 1 millionth of a gram.

30

GUAVA SEEDS

Col. Sumshere Singh sends me the following:

"I have been at pains for some time to gather what information I could on the subject of guavas and their seeds. All that I could elicit from my environment was the fact that the seeds of this fruit were as a rule swallowed down without mastication, probably for their laxative effect. A few indigenous practitioners of medicine stated that the seeds also possessed cardiac tonic properties.

"I was very glad, therefore, to be furnished with the following authoritative note on the subject by a friend from Calcutta:

'Guava has been shown recently by Dr. B. C. Guha of the Bengal Chemical & Pharmaceutical Works, Ltd., to be quite rich in vitamin B. Its seeds have got the following constituents:

Proteins	..	15.25 per cent		
Fat	..	14.3	"	
Starch	..	13.25	"	
Sugar	..	0.1	"	etc.,

showing that these (i.e. the seeds) are quite rich in nutritive value. Consequently, the seeds and fruit should be well masticated. If eaten without proper mastication, the seeds will only act as laxative. No work has been done on the cardiac tonic properties of guava.'"

Harijan, 18-5-1935

31

MANGO SEED KERNEL

A friend has sent me an extract from *Current Science* showing how mango seed kernel is a fair substitute for cereals and fodder.

"According to a recent estimate, the concentrates available in India are sufficient only for 29.1 per cent and fodder for 78.5 per cent of adult bovine population. This does not take into account the requirements of goats, sheep and equines. The shortage is further accentuated during periods of famine. In order to meet the shortages, the Nutritional Research Laboratory at Izatnagar have been exploring new sources of foodstuffs. This investigation relates to the use of mango seed kernel as a cattle and human food. At present the material is thrown away as a waste. From chemical analysis of kernels it has been found to be rich in carbohydrates and fats (crude protein 8.5 per cent, ether extract 8.85 per cent and soluble carbohydrates 74.49 per cent on dry basis.)

"The observations credit mango seed kernel with a place in the category of food grains and make available every year about 70 million lb. digestible protein and 780 million lb. of starch equivalent from a hitherto unutilized source. It has been also calculated that the digestible protein obtained from 80 lb. of oats is equal to that of 100 lb. of the kernel and the starch equivalent for 86 lb."

I have known this use from my early youth. But no one seems to have thought of conserving this seed for food. The mango season is upon us and though much time has been lost, it will be a good thing if every mango seed was saved and the kernel baked and eaten in the place of cereals or given to those who need it. Every ounce of food saved is so much gained.

Delhi, 21-5-'46

Harijan, 26-5-1946

SECTION V: MILK

32

COW'S MILK v. BUFFALO'S

The question whether cow's milk is superior to buffalo's has come up for inquiry in considering that of village re-construction. I have addressed friends on the subject. Shri Haribhau Phatak has forwarded to me a letter received by him from Prof. Rao Bahadur Sahasrabuddhe, which reads as follows: —

> "With regard to your enquiry about the differences between cow milk and buffalo milk, I have to say that the fat and casein of cow milk are more easily digestible than those of buffalo milk. The cow milk has also greater amount of vitamins than buffalo milk. These qualities affect children and adults equally, but an adult can digest buffalo milk while a child cannot, I think this is all that you want."

He has also received an opinion from Dr. S. K. Apte of Sholapur, Vice-President, Gopalak Sangha, which is reproduced below, the names of those who sent replies to his questionnaire and some of the replies themselves being omitted.

> "The question whether cow milk is superior to buffalo milk is being discussed during the last three years, and this has had a good effect in attracting public attention to the utility of cow milk. In India, from older writings and age-long belief, it is conceded that cow milk is superior to buffalo milk. The same conclusion can be drawn from the fact that in other countries only cow's milk is used. But in this age of science, no theory is taken as accepted until it is proved by demonstrations. It will not do merely to say that cow milk is superior to buffalo milk because our ancestors did, and other countries do, use cow milk. The burden of proving that it is superior lies on those who assert so. There are several ways of proving this scientifically. They can be enumerated as follows:
>
> 1. To compare the merits and demerits of both milks by analysis of their components. It is possible chemically to ascertain

the nutritive value of their components. Such an experiment has been made by Prof. Rao Bahadur D. L. Sahasrabuddhe of the Agricultural College, Poona, the details of which he has published in the *Dnyanprakash* dated 11-9-1934. He has made it clear therein not only that cow milk is very useful for the nutrition of young children but that buffalo milk is actually harmful to them. Prof. Sahasrabuddhe says:—

'The buffalo milk is rich in fat, which children cannot digest. On account of indigestion they suffer from Diarrhoea. The acids in the undigested fat draw up salts from the body which are necessary for the building of bones and the lack of which is responsible for rickets. The fats in cow milk and buffalo milk differ from each other in their digestive properties. The percentage of volatile and soluble acids is greater in cow ghee, and consequently it is more easily digested.'

The experiment which Prof. Sahasrabuddhe has made also proves that the casein in cow milk is digested in the stomach more easily than that in the buffalo milk. His whole essay is informative and instructive.

2. To make two equal groups of boys or men living under the same conditions and to provide one batch with about a seer of cow milk and the other with an equal amount of buffalo milk for a certain period and to watch and record the physical, mental, and intellectual development of each member of both the groups. This is the second way of ascertaining which milk is superior to the other. No such experiment is made in Europe or America as there are no buffaloes there. The Gopalak Sangh of Sholapur had written to the *Hoard's Dairy-man* for information as to which countries except India use buffaloes as dairy animals. The reply to this query shows that buffalo milk is used outside India only in the Philippine Islands and the southern part of China. As for the Philippine Islands, however, the residents there prefer cow milk to buffalo milk as they are convinced of the utility and importance of the former (vide *Gorakshan* Poona of 28-4-'34). An experiment of the above nature is, therefore, not likely to be made anywhere outside India. This experiment will have to be made on some students residing in a Boarding House. This being an expensive task, the Gopalak Sangh, Sholapur, had requested other cow-protection societies and philanthropic rich men to finance the Sangh for a comparative study of this nature, but it is regrettable that none of them came forward. If sufficient pecuniary help had been obtained, the experiment could easily have been carried on in the Dr. Chati Anath Vidyarthi Graha, Sholapur, by selecting two groups of boys in that boarding, and providing each group with a sufficient quantity of either milk and marking the results. I earnestly request every institution

and individual to see if any one can make such an experiment and to publish the result thereof.

3. This comparative experiment on human beings is a matter of great expense. It is possible to try this experiment on animals, especially rats and guinea-pigs kept in experimental laboratories. As the Gopalak Sangh has no material available for this sort of experiment it has written to the Government Pasteur Institute at Coonoor to try such an experiment; but no reply has yet been received from the authorities there.

4. The Gopalak Sangh, Sholapur, took recourse to a fourth, and the easiest, way towards this end. A questionnaire regarding cow and buffalo milks was prepared and sent some six months back to various doctors, physicians, research experts, newspapers and periodicals, and Government officers in Medical and Health Departments in and outside India. About seven hundred copies in Marathi and English of this questionnaire were then sent out. Many newspapers and periodicals in India and *Hoard's Dairy-man* in America published it and asked for the views of their readers thereon. Of the replies we received, only two came from outside India—one from America and the other from the Government Medical Department in Ceylon. About fifty replies have been received so far.

The following are the conclusions deducible from the replies:

1. Buffalo milk is injurious to the development of children and only cow milk is, in the absence of mother's milk, useful to them.

2. Cow milk, being easily digestible, is more beneficial to patients than buffalo milk.

3. There is no definite evidence to show that the use of buffalo milk by adults is in any way injurious. Mr. Bruen, the live-stock expert to the Government of Bombay, says that buffalo milk is hard to digest by a person of any age, because the excess fat in buffalo milk when it form soap in the intestine, is hard to digest with the usual amount of salts, and it takes the deficient quantity of the mineral salts from bones, which are consequently weakened. This does not occur in the digestion of cow milk.

4. Cow milk is useful for intellectual growth, mainly of children. No definite conclusion can be drawn regarding better effect of cow milk on the intellectual growth of adults.

5. If, instead of rearing up buffaloes, cows are kept in the city, it will produce a beneficial effect on the general hygiene of that city with less expense."

The experiment that Dr. Apte has suggested is worth making. The question of the comparative merits of the cow and the buffalo is of national importance from many points of view. In no other country in the world do these animals play the part that they do in the life of the nation in India.

Even without further experiment, the opinions collected by Dr. Apte of eminent medical men and dairy experts sufficiently prove the superiority of cow's milk over buffalo's.

Harijan, 22-2-1935

33

SKIMMED MILK

Prof. Warner of Allahabad Agricultural Institute sends me a copy of a note submitted by him to a Municipal Board in U. P. The Board has passed a bye-law requiring that " all skimmed milk sold in the city should be coloured in order that it may be easily identified as skimmed milk, thereby preventing its use in diluting or adulterating whole milk." Prof. Warner is of opinion that this is a dangerous bye-law whose effect would be total destruction of a valuable protective food. He has shown in the note, I think conclusively, that skimmed milk as an article of food is not to be despised, the only difference between whole milk and skimmed milk being that a large percentage of fat is removed from skimmed milk for preparing butter, but the milk retains all the salts and all the proteins. Adulteration, therefore, of whole milk with skimmed milk produces very little effect upon its nutritive value. Only the percentage of fat is reduced somewhat. He gives figures in support of his argument which I need not reproduce. He does not mind bye-laws preventing adulteration even with skimmed milk. But he strongly objects, and I think rightly, to destroying skimmed milk

by colouring it, and he shows that not only is a valuable article of diet taken away from the mouths of poor people, but the danger of adulteration of milk with water increases. And this danger is very real, because the greater the percentage of water the lower is the nutritive value of milk. And add to this the fact that the water itself may be impure. Prof. Warner draws a distinction between requiring the colouring of vegetable ghee for preventing adulteration of real ghee, and the colouring of skimmed milk. It is wholly necessary that vegetable ghee should be coloured with some innocuous dye. Coloured vegetable ghee will be used by the people for its cheapness. But as there is already prejudice against skimmed milk, people will refuse to take coloured skimmed milk, even though the colouring matter may be utterly innocuous. I would on my own behalf enforce Prof. Warner's argument by suggesting that municipalities will do well to popularize the use of skimmed milk. It can be sold very cheap and it is perfectly wholesome thing both for the rich and the poor, and is a good sick man's diet, when whole milk is rejected by the digestive apparatus.

On the train to Calcutta, 16-2-'40

Harijan, 9-3-1940

34

COW'S MILK FOR LEPERS

[Dr. Santra is an authority on leprosy. What he says should carry weight. Apart from my views on the cow, the medical profession owes a duty to the country to discover the relative values of different milks. —M. K. G.]

"I cannot offer scientific argument in favour of the theory that protection of the cow will protect us from leprosy, but there are indications that the use of milk reduces the virulence of leprosy.

"In the last century a Sikh Baba got the reputation of curing leprosy at Sitalani in the Amritsar district. This reputation reached the ears of the Government, and the popular belief

regarding the cure was so strong that the Government instituted an enquiry. The Civil Surgeon of Amritsar visited Sitalani and reported that the reported improvement was true, and that it was due not to any secret remedy but to the inclusion of a liberal amount of milk in the diet of the lepers who came to stay there.

" Dr. Muir, the father of anti-leprosy campaign in India, advised that lepers should take two seers of milk a day. The propaganda leaflets that he prepared had the picture of a cow, and he advocated the use of cow's milk.

" In recent days Dr. Cochrane of South India found that children having a malignant type of leprosy became benign more quickly when they got skimmed milk in addition to treatment. He would have done a great service, if he had obtained the milk locally rather than getting the powder from foreign countries. That would have given an opportunity to the lepers to do goseva and provide manure for the kitchen gardens. Some time back it was claimed that vitamin A produced changes in leprosy towards good. We know that cow's milk, specially of those who feed on green grass, is very rich in vitamin A. Thus we have some scientific indication that the use of cows' milk will decrease the virulence of leprosy. When it becomes benign, the disease being unable to propagate itself, the number of lepers will naturally decrease."

Sevagram, 23-3-'42

Harijan, 29-3-1942

SECTION VI : GHEE AND OIL

35

COW'S GHEE v. BUFFALO'S GHEE

Dr. Profulla Ghosh has been examining the comparative value of cow's milk-ghee and buffalo's milk-ghee. He writes :

"I have ascertained the opinion of three chemists (1) Dr. Mahendra Goswami, D.Sc., Prof. of oil and fat Chemistry in the Department of Applied Chemistry, University College of Science, Calcutta . (2) Dr. K. P. Bose, D.Sc., Ph.D., Head of the Department of Bio-Chemistry, Dacca University and (3) Mr. Ramaswamy Ayyar, fat and oil Expert of the Indian Institute of Science, Bangalore. I have also consulted the literature myself. The comparative vitamin contents of both varieties of ghee have also been examined by Dr. B. C. Guha of the Bengal Chemical Works at my request. By collecting all the facts I have come to the following conclusion:

In the present state of our knowledge, it is not possible to pronounce definitely which of the two varieties of ghee is better from the dietetic point of view."

Harijan, 22-3-1935

36

BUFFALO MILK-FAT v. COW MILK-FAT

Dr. Godbole, Professor of Industrial Chemistry in the Benares Hindu University, has sent me at my request an elaborate and critical analysis of these two fats. It is far too technical for the lay reader. I shall gladly lend it to any student of this important subject. Meanwhile I content myself with giving his conclusions.

"1. Cow's butter-fat is known to have iodine in its composition, whereas no data is available on this point in the case of buffalo butter-fat.

"2. Both cow's butter-fat and buffalo-butter-fat contain vitamins A and D; but cow's butter-fat is richer in vitamin A, while the other is richer in vitamin D.

"3. Butter-fat as such is any time better than tallow, lard or vegetable ghee.

"4. Cow's butter-fat is richer than the buffalo-butter fat in the total assimilable and digestible part and is, therefore, comparatively more suitable for children and weaklings.

"5. From an economic point of view, the buffalo is a better butter-producing machine than the cow.

"Of the two butter-fats, cow's is in a sense nearer to the composition of human body-fat than the buffalo-butter-fat."

Harijan, 29-3-1935

37

GHEE

Those who can afford it are fond of eating ghee. It enters into the preparation of almost all the sweetmeats. And yet, or perhaps by reason of it, it is one of the most adulterated articles of food. The vast bulk of it that one gets in the bazar is undoubtedly adulterated. Some, if not most, of it is mixed with injurious fats which non-meat-eaters must not eat. Vegetable oils are often mixed with ghee. This mixture diminishes the vitamin value of ghee when it does not contain rancid oils. When the oils mixed are rancid, the ghee is unfit for consumption.

At Maganwadi we have been insisting on procuring cow's ghee. It has mean much difficulty and great expense. We have paid as much as Rs. 50 per 40 lb. plus railage.

This can only be for a rich man's pockets. We are trying as much as we can to approximate the poor man's standard consistent with balanced diet scale. I observed that Dr. Aykroyd had omitted ghee from his balanced diet scale. Medical testimony, while it insists on milk or buttermilk, does not insist on butter or ghee as an indispensable part of the daily menu. We have tentatively dropped ghee from our menu, except for those who consider it to be necessary for their health. We are issuing an equivalent in weight of pure fresh vegetable oils. Millions in India never know the taste of ghee. After all it should

be borne in mind that those who take milk get some ghee in the purest and most assimilable form. Apart from the question of relish it may safely be said that village workers can with impunity omit ghee from their diet so long as they can procure some milk or curds or buttermilk.

At the same time it is the duty of wealthy people and public bodies like municipalities to place at the disposal of poor people cheap wholesome unadulterated milk and its products. Adulteration of milk or other foods should be as difficult as counterfeit coin or note or postage stamp, and their value should be standardized as is that of postage stamps.

If half the skill that is today devoted to the management of commercial concerns meant for private gain were devoted to the conduct of dairies for the public benefit and shops for foodstuffs, they could be run as self-supporting institutions. There is nothing to prevent them from becoming so, except the public disinclination to give the requisite skill and capital to such philanthropic concerns. The benevolence of the wealthy is exhausted in the effort to run *Sadavrats*, to misfeed the ever-increasing army of beggars who are a burden on society. For they eat without labouring. It is benevolence misplaced, if it may not be described as mischievous. The difficulty amounting to impossibility of getting wholesome articles of diet at reasonable rates in every town and village, is a great stumbling block in the way of the village worker. Time is not wasted when village workers attempt to find out by experiments what in spite of this handicap are the indigenous sources of procuring an adequate diet.

Harijan, 2-11-1935

38
ADULTERATION OF GHEE

Shri Pannalal, an old member of Sabarmati Ashram, is a lover of cattle. He has for years been a lay farmer and dairyman. He has tried to study the cattle question. Very few people realize that conservation of cattle wealth of India is a major economic problem beset with many complexities. Adulteration of ghee has always been one of them. During the last few years it has become a growing menace owing to the import of cheap vegetable oil miscalled ghee because of its having been congealed and otherwise processed so as to look like ghee. Shri Pannalal says that middlemen and sellers of dairy products profusely adulterate real ghee and thus undersell the farmer or cattle-keeper. He says that it is impossible for farmers to hold out against this competition if the mischief continues for any length of time, especially as such vegetable ghee is being manufactured in Bombay and elsewhere on a large scale. Shri Pannalal rightly adds that agriculture without dairying and cattle breeding for draft purposes will be an impossibility if real ghee disappears from the market. Cattle-keeping will then become a luxury instead of a paying occupation. Shri Pannalal, therefore, suggests that drastic measures should be taken to prevent adulteration. I heartily endorse the suggestion. There should be a well regulated public agitation against adulteration, and preventive legislation should be passed if necessary. In addition to the economic this adulteration has a medical aspect which is no less important than the economic. It is well known that vegetable 'ghee' has a much lower protective value than ghee. From the health point of view, doctors say, vegetable ghee can never be a substitute for real ghee. This is, therefore, a question for corporations, medical men and humanitarian leagues to tackle without delay. If corporations have not adequate

powers, they should have them. Shri Pannalal says: "The remedy is not very difficult if the will to is there. It is quite feasible to make it compulsory by law to add some edible colour or flavour to each and every tin of vegetable ghee, whether imported or produced in India. This will readily distinguish the vegetable product from the genuine ghee and make detection easy. If it is possible to stamp each match box with a Government seal, surely it is not difficult to have every tin of vegetable ghee duly coloured or flavoured similarly."

Segaon, 8-1-'40

Harijan, 20-1-1940

39

ADULTERATION OF GHEE

Dr. Kailas Nath Katju writes:

"I have read with great interest in *Harijan* of 20th January your note on adulteration of ghee. It may interest you to know that before we resigned office in the U. P. this problem had engaged our closest consideration. Adulteration is rampant and must be stopped. The misfortune is that it is not only the ghee-dealer and the middleman who have taken to adulteration, but even the ghee producers in the villages are resorting to adulteration in their own homes before they bring ghee to the market. The cheap vanaspati and other vegetable ghee so-called make adulteration such an easy process. We considered the question of compulsory admixture of vegetable oils with some edible colour or flavour, but the difficulty is to discover some such harmless colour or flavour. In the hot climate of India there is a danger of injury to health by the use of such fast colour.

"We had drafted and introduced in the U. P. Legislature a comprehensive bill to stop this mischief. It was at the committee stage when we resigned. The bill confers power on the Provincial Government to prescribe colouring or flavouring of artificial ghee or vegetable oils. But I think the more useful and really important provision in the bill for the purpose in hand is that which arms the Provincial Government with the power to prohibit sale of artificial or vegetable ghee in ghee-producing areas. I have known of rural areas where ghee is produced on a large scale and where practically no one consumes vegetable

ghee, yet vegetable ghee is sold in huge quantities and purchased by people for purposes of adulteration. We thought that in such areas where vegetable ghee is really sold for these universal purposes the only proper method is to prohibit its sale altogether, and thus protect and foster the genuine ghee industry.

"I hope this measure will meet with your approval. Agriculture without dairy industry cannot flourish. In the U.P. we also encouraged the formation in large numbers of ghee co-operative societies, and I insisted that the bye-laws of such societies must have stringent regulations to stop and check adulteration by its members. That was also proving efficacious.

"I am writing this to you in the hope that it may interest the readers of *Harijan.*"

The suggestion made by Dr. Katju about specially dealing with ghee producing areas is worthy of consideration. Indeed the question of adulteration of this important article of national diet is so important that it requires all-India treatment. It need not wait for disposal of the so-called higher politics.

On the way to Delhi, 5-2-'40

Harijan, 17-2-1940

40

VANASPATI AND GHEE

Sardar Sir Datar Singh has been putting up a fight on behalf of the cow in India. The cow includes the buffalo. In that case both can live. If the buffalo includes the cow then both die. "The cow is the mother of prosperity." To understand how this is so, the reader should see Shri Satish Chandra Das Gupta's two instructive volumes.* Here I want to confine myself to ghee which is in danger of being swamped by *Vanaspati*, as the so-called vegetable ghee is called. In reality ghee is pure animal product. One thoughtlessly uses the expression vegetable ghee or *Vanaspati*, but it is a contradiction in terms. Sardar Datar Singh has shown in a considered

* *The Cow in India.* Vol. I Rs. 10, Vol. II Rs. 7, both together Rs. 16, postage Re. 1-9-0; Khadi Pratisthan, Sodepur, Calcutta.

note that the sale of *Vanaspati* has risen from 26,000 tons in 1937 to 137,000 tons in 1945, i.e., it has increased more than 400 per cent during seven years. *Pari passu* the ghee industry has declined. Those who would study the whole note should procure a copy from Sardar Datar Singh or the Goseva Sangh in Wardha. I condense below the Sardar's conclusions :

1. *Vanaspati* as an article of diet is a very poor substitute for ghee. It not only lacks absorption by the human system, but has no vitamin potency.

2. Due to its similarity with ghee in texture and flavour, most of it is being used as an adulterant or is passed off as genuine ghee and is therefore a great menace to ghee.

3. Due to great margin of profit in this industry, it has developed from 26 thousand tons per annum in 1937 to 105 thousand tons in 1943 and there are proposals afoot to at least double this production in the near future.

4. The ghee industry is India's greatest cottage industry involving production of 23,000,000 maunds of ghee per annum at a cost of one hundred crores of rupees.

5. The destruction of the ghee industry will not only adversely affect the welfare of the cultivators but it will have a very deleterious effect on the cattle industry upon which the prosperity of the whole nation directly depends.

In order to overcome the difficulties explained above, the following remedial measures are suggested :

1. If due to some reasons the Government cannot actually ban the manufacture altogether of *Vanaspati*, it must at least be brought under strict control immediately.

2. All manufacturers, and wholesale and retail dealers of *Vanaspati* should be licensed. Such persons should not be permitted to trade in or stock ghee on their premises.

3. It should be made compulsory to colour all *Vanaspati* at the source of its manufacture in India and to colour all such imported product immediately on its landing at an Indian port. Manufacturers must mix ten per cent of *til* oil with *Vanaspati*. The advantage of this would be that if pure ghee is adulterated with *Vanaspati* containing 10 per cent *til* oil, the detection will become extremely simple. The presence of *til* oil can be most easily detected by well-known chemical reactions.

4. The addition of synthetic essences to give *Vanaspati* a semblance of ghee should be prohibited.

5. Persons selling food products in the preparation of which they use *Vanaspati* should be required, under marketing law, to

display a sign to that effect. The presence of *Vanaspati* on the premises not displaying the sign should be made an offence under law. This will eradicate the evil of *Halwais* and confectioners using *Vanaspati* for their preparations and passing them off as made from genuine ghee.

6. *Vanaspati* should not be allowed to go in the market under names such as 'Vegetable ghee' or '*Vanaspati* ghee' or any other name which is apt to deceive the customer as to its real origin or composition.

7. *Vanaspati* should not be allowed to be marketed in packages of the same pattern as used for packing ghee and all packages containing *Vanaspati* should be distinctly labelled.

It is clear that the mischief arises principally from the greed of the very persons who worship the cow. *Vanaspati* is wholly superfluous. Oils may be refined of injurious property, but they do not need to be solidified nor need they be made to look like ghee. An honest manufacturer will not stoop to counterfeits. The market is flooded with them. Counterfeit coins are heavily punishable. Why not counterfeit ghee, since the genuine article is much more precious than coins? But the sovereign remedy lies in all round honesty among dealers who are in a hurry to become rich even at the cost of the health of the nation.

New Delhi, 8-4-'46

Harijan, 14-4-1946

THE DANGER OF 'VANASPATI'

"In *Harijan* of 14-4-'46 you supported Sardar Datar Singh's plea regarding a ban on '*Vanaspati*'. There were several suggestions in that article which, had they been acted upon, would have checked the evil. But unfortunately no action has been taken. In the Punjab, in Akola, Shegaon and Kurnool permission has actually been given for starting new factories. At any rate this should be stopped. In the Punjab the Government has not even ordered the colouring of '*anaspati*'."

The above is the substance of a letter to me. I have advisedly put '*Vanaspati*' in inverted commas. It ought really to be *Vanaspati* Ghee. No one can have any quarrel with *Vanaspati* which means the leaves of flowers, fruits and vegetables. But when it presumes to pass as something else, it becomes a poison. *Vanas ati* is not and can never be ghee. If ever it were to become ghee, I would be the first loudly to proclaim that there is no further need for real ghee. Ghee or butter are the fat contents of milk drawn from an animal. To sell vegetable oil or butter in the form and name of ghee is to deceive the Indian public. It is thoroughly dishonest. It is the clear duty of tradesmen not to sell any product of this nature in the guise of ghee, and no government should countenance such sale The crores of India today get neither milk nor ghee nor butter, nor even buttermilk. No wonder that mortality figures are on the increase and there is lack of energy in the people. It would appear as if man is really unable to sustain life without either meat or milk and milk products. Anyone who deceives people in this regard or countenances the fraud is an enemy of India.

New Delhi, 6-10-'46

Harijan, 13-10-1946 (*From the original in Hindustani*)

GRAMASEVAKS TRAINING CENTRE
27 SEP 1955
T. KALLUPATTI

DIET AND DIET REFORM

PART II

SECTION I: GENERAL

1

PRECAUTIONS AGAINST ILLS OF THE SEASON

In the wake of rain has come malaria and we have two or three sick beds every now and then. But our precautions and aftercare have ensured plain sailing so far. The rigid rules we have laid down and are following may be of use everywhere during this season. The first rule, applicable to all, is the general rule to leave your meal when it tastes sweetest, i.e. to leave it partially hungry. The second rule is to avoid foods containing an excess of proteins (all *dals* — pulses for instance) and to skip a meal as soon as you feel ready. The third rule, as soon as you feel out of sorts, or have a feeling of feverishness is to have an opening dose of castor oil and a fast. Whilst a fever or cold is on, repeated doses of hot water and lime and salt (or *gur* or honey) is the usual treatment. All food, even milk, is to be scrupulously eschewed, and there should be no hurry to resume normal diet on the disappearance of cold or fever. The fourth rule, for those who can afford, is the use of a mosquito net and for the poorest to smear the exposed parts of the body, while sleeping, with kerosene oil. In almost all cases here we have fought colds and fevers successfully by this treatment and have not had to have recourse to quinine (though quinine is by no means taboo).

M. D.

Harijan, 27-7-1935

2

DIETETIC CHANGES

We have taken care to consult medical opinion in all our dietetic experiments, and whilst books on diet and vitamins have been useful, we have had quite a lot of support from Dr. Tilak's little booklet on *Balanced Diets** which contains all necessary information on a balanced diet of enough proteins, carbohydrates, fats, organic salts and vitamins, to keep a man perfectly fit and healthy. The book is based on experiments made in the improvement of the diet of over a hundred children in the Byramjee Jeejeebhoy Home, Matunga (Bombay), whose diet was remodelled and brought as near to a balanced diet as possible by the inclusion of soya beans, rice polishings, fresh oilcake, dried skim milk, and preparations of sprouted seeds, the children having been on this diet for over eight months. Soya beans and oilcake we have not yet tried. We made a beginning with oilcake this week. Oilcake is more proteinous than milk and less than pulses, and Gandhiji wondered if during the rainy season at any rate, we might not substitute it for *dal*. The first day's preparation in which oilcake was mixed with water and served in liquid form scared many of us away, more because it was sticky being linseed, than because it was unpalatable. The next day it was served in the form of dry powder. That did not scare people away, and the third day it was served in a liquid form, mixed with buttermilk and slightly spiced. This last carried people off their feet and promises to be very popular. The *dal* has not yet been eschewed, but we seem to be on a fair way to it. Dr. Tilak's balanced diet chart allows two ounces of pulses and half an ounce of oilcake for an adult. We propose to try next the introduction of soya beans.

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* To be had of Dr. H. V. Tilak, Bombay Presidency Baby and Health Week Association, Bombay 11.

The introduction of this new article in our diet was the occasion of considerable excitement in our midst and Gandhiji asked everyone to express in writing what he or she felt about it. The next day came a little slip of paper signed by three members of the household expressing strong disapproval of the innovation. Gandhiji who had given only oilcake that day in substitution of *dal,* immediately restored *dal* in our menu and reassured the family that he did not want to rush these innovations.

M. D.

Harijan, 27-7-1935

3

MORTIFICATION OF THE FLESH

Whilst Gandhiji insists, as we have seen, on a village worker living on a villager's diet not costing say three annas a day, he is far from insisting on starvation or mortification of the flesh. To a worker who has imposed on himself a strict regimen involving only one meal a day, consisting generally of 15 tolas of raw rice boiled, *amti* (made of vegetable and *dal*) and buttermilk, all costing only one anna per day, Gandhiji wrote :

" Your meal is very meagre, it is starvation diet. In my opinion, you are not making full use of the instrument that God has put at your disposal. You know the story of the talents * that were taken away from him who did not know how to use them, or having known would not use them ?

" Mortification of the flesh is a necessity when the flesh rebels against one ; it is a sin when the flesh has come under subjection and can be used as an instrument of service. In other words there is no inherent merit in mortification of the flesh."

M. D.

Harijan, 2-11-1935

* 'Take therefore the talent from him' (who had not used his talent but buried it) 'and give it unto him which hath ten talents' (who had made ten out of the five given him). 'For unto everyone that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath.' Mat. 25: 28-29.

4
VITAMINS — I

Absence or insufficiency of minute traces of certain substances other than protein, carbohydrate, fat and mineral salts present in natural foodstuff causes certain well-defined symptoms of diseases and ultimately produces death. These substances were called vitamins. The name was first given to an impure chemical compound isolated from rice polishings by Funk. That compound contained nitrogen, and as it was essential for life it was termed vitamine-life-amine. Later investigations on these compounds have shown that most of them (so far isolated) do not contain any nitrogen. So the name vitamine is a misnomer. But as the term was a current coin for a long time, only the terminal 'e' was dropped at the suggestion of Drummond and these compounds are now designated by the general term 'vitamin'.

Existence of vitamins was first recognized by the well-known principle of cause and effect. Even in 1928 McCarrison wrote: "Though these substances are essential to life and are builders of our bodies, we cannot as yet make them nor see them nor weigh them, as we can make, see and weigh the other constituents of our food: the proteins, the fats, the starches, the sugars, the mineral salts and water." But the painstaking series of researches of scientists during the past few years have altered the position considerably. Of the eight or nine vitamins known today four have been isolated in a pure state. These are vitamins A: the fat soluble factor of growth, B: the antineuritic vitamin, C: the antiscorbutic vitamin, and D: the anti-rachitic vitamin. Not merely these four have been isolated, the scientists have gone further. Through their efforts vitamin C can now be obtained in any desired amount in a pure crystalline condition. It

has also been synthesized. Vitamin D has been obtained in a pure crystalline condition by irradiating ergosterol present in animal and vegetable fats. "It is of interest to learn that vitamin D purchased as pure crystals now costs only one-eighth of its price in cod-liver oil and the daily dose can be brought for less than one-tenth of a penny." (Carr) Although vitamin A has not yet been synthesized, its reduction product Perhydro-vitamin A has been synthesized. Of the four vitamins structural formulas can only be advanced for vitamins A and C, the credit for which is mainly due to Karrer and his co-workers of the Chemical Institute of Zurich.

With these preliminary remarks I shall proceed to discuss the four vitamins in detail.

Vitamin A

It was recognized that night-blindness and Xerophthalmia (a disease of the eye) occur when fresh green vegetables, pure good milk and certain other things are eliminated from the diet, and they are cured when cod-liver oil is administered for some time. Previous administration of cod-liver oil also prevents the occurrence of these diseases. This indicates the presence of certain substance in cod-liver oil as well as those natural foods which is a preventive as well as curative for night-blindness and Xerophthalmia. It was also recognized that the absence of this factor inhibits the growth of the animal. It was designated as vitamin A. Although cod-liver oil is a very good source of vitamin A, it is present in such a minute quantity there that vitamin A could not be isolated from it. It may be mentioned here that cod-liver oil contains 99 per cent fat and of the 1 per cent non-fatty substances vitamin A is only a minute trace. This shows what minute quantities of this vitamin we require for a healthy life.

It was only after the discovery by Von Euler and Karrer that certain fish-liver oils were found to contain 200-2000 times the amount of vitamin A present in

common cod-liver oil that the isolation of vitamin A was possible. One such fish is Halibut. But fish-liver oils are much richer in vitamin A in summer than in winter. For instance, Halibut oil contains 20 times more in summer. This depends on the nature of food taken.

Vitamin A is a viscous light oil, containing only carbon, hydrogen and oxygen. It is a complex alcohol soluble in fat and is very little soluble in water. As it is a compound containing four conjugated double bonds it is readily oxidized.

Only the animal world contains vitamin A, but it is derived from the vegetable source which supplies carotene and similar other plant pigments. Therefore carotene is called Pro-vitamin A. One molecule of carotene is converted into two molecules of vitamin A in the animal and human systems. Uptil now carotenes and kryptoxanthin (pigment of the yellow maize) have been recognized as Pro-vitamin A. Carotene is present in all green leafy vegetables, peas and beans, carrots, orange or yellow fruits and vegetables. Excellent sources of vitamin A are fish-liver oils, butter, cream, eggs and cow's milk. But the vitamin A content of milk depends on the nature of food taken by the cow. An abundant supply of green fodder is to be ensured in order to get milk rich in vitamin A. Of course it goes without saying that butter and cream contain more vitamin A than milk, but their vitamin content also depends on the nature of milk from which they are prepared. Generally town cows' milk contains less vitamin A as they get more of cereals than of green fodder.

But no one need go to these animals and costly sources for vitamin A. It is immaterial for men in general whether the vegetable world contains carotene or vitamin A, so long as the ultimate effect is the same. Let me quote from *Vitamins: A survey of the present knowledge* (1932 edition): "Animal sources of vitamin A such as milk-fat, eggs, mammalian-liver and cod-liver oil are expensive, but when it is remembered that this vitamin is supplied by all green vegetables and others which contain

the yellow colouring matter carotene, the problem can be cheaply solved wherever vegetables can be grown. For example, green spinach and green cabbage (but not white) are weight for weight as good as the best New Zealand butter." We have in the *Annual Review of Biochemistry for 1935* p. 396 also: "Green leafy vegetables (spinach, kale, collards, turnip greens, beet tops, mustard greens) peas, asparagus and snap beans are economical sources of iron and vitamins A and G. Carrots, apricots and other coloured (orange or yellow) fruits or vegetable furnish vitamin A." Moreover, long-continued feeding of foods rich in cholesterol, vitamin D and fats (eggs, cod-liver oil and other animal fats) may produce arteriosclorosis in man.

Ripe mangoes and *papayas* contain a good deal of carotene. Sweet pumpkins which grow abundantly in many parts of India also contain carotene.

It is not essential to take every day the required amount of vitamin A as it is necessary to take carbohydrate for supplying required calories. When the intake of carotene is in excess of the requirement it is converted into the vitamin and stored up in the liver for future use, specially when there is deficient intake.

P. C. GHOSH

Harijan, 30-11-1935

5

VITAMINS — II

Vitamin B1

The disease beri-beri is commonly attributed to deficiency of this vitamin, although whether this is the sole cause or some other additional factor is necessary has not been finally ascertained. Deficiency of this vitamin also causes lack of appetite and defective movements in the alimentary canal. It has been isolated from yeast and rice polishings. It is soluble in water. It contains carbon, hydrogen, nitrogen, sulphur and oxygen. It is one of the most stable vitamins, is fairly resistant to heat and oxidation. It is destroyed at 120°C but the decomposition at 100°C (the temperature of boiling water) is insignificant. "Continued heating of foodstuffs at 100°C, however, leads to some loss of the vitamin. In preserving and canning foodstuffs the temperatures employed are frequently much higher than 100°C, and canned foods of all description may contain very little or no vitamin B1 and, as a practical rule, should therefore be regarded as free from it, unless they have been specially investigated and found to contain it." Foodstuffs should not be boiled for more time than is necessary to keep this vitamin almost intact. Most people derive their supply of vitamin B1 from cereals and pulses. Different parts of cereals vary widely in their vitamin B1 content ; the largest amount is found in the embryo or germ, the bran (pericarp, and aleurone layer) comes next in order, whereas the endosperm is deficient in the anti-neuritic factor. Hence the inferiority of white wheaten flour or mill-polished rice as diet.

This vitamin is soluble in water ; therefore boiling of any foodstuff with excess of water and then decanting to supernatant liquid would deprive the foodstuffs of almost the whole of its vitamin B1 content. In Bengal people

generally use *dhenki*-husked rice but they boil that rice with excess of water and after it is well boiled decant the liquid from the solid. Such rice is no protection against beri-beri. The people of Bengal should give up this bad practice. In the preparation of *chapati* from wheat there is no danger of vitamin B1 content of the wheat being diminished. Yeast is the richest source of vitamin B1. Eggs are also valuable sources of the anti-beri-beri factor. Large deposits of this vitamin in the seeds of plants and eggs of animals (birds and fishes) suggest a due provision made for the wants of the young offspring during the early period of life. The prevalence of beri-beri among pregnant women in countries where the disease is endemic also suggests that they require more of this vitamin for the growth of their yet unborn offspring.

" Of the green vegetables tested, watercress and letuce proved to be about twice as rich as scabbage and spinach and not inferior to egg yolk or the embryo of cereals, if dry weights are compared." (*Vitamins: A Survey of the Present Knowledge*). Of the common Bengali foodstuffs the richest source is *poin-shak* (*Bassela cordifolia*), then we have *dherosh* (*Bhindi*), *gima shak* and cabbage. Potato contains a small quantity of vitamin B1, but the large quantities of potato consumed make it a good source of the vitamin in an ordinary diet. Milk is poor in this vitamin.

Toddy contains a good quantity of this vitamin, but no one should advocate toddy drinking on this ground. Toddy has its bad effects. " The balance of the pharmacological opinion is in favour of the view that had alcohol been discovered late it would have never been used as a medicine." (Pyman : Synthetic Drugs.)

Vitamin C

Deficiency of this vitamin leads to scurvy, a disease characterized by a spongy condition of the gums and a tendency to haemorrhages into the gums, muscles, joints and internal organs. It was for centuries the scourge of

the sailor and the explorer who could not get fresh vegetables or fruits. They discovered empirically that an addition of lime juice to the diet would prevent it. But certain animals, such as the rat, mice, pigeons and chickens do not get this disease even when they are kept on vitamin C-free diet. Probably they can synthesize vitamin C from other articles of diet which the human system cannot do.

Vitamin C was first isolated in a crystalline condition in 1928 from the cortex of the adrenal gland. Later on it has been isolated from lemon juice and other substances. It is an acid and it has got anti-scorbutic properties, so it is now known by the name of ascorbic acid. It is a compound of carbon, hydrogen and oxygen. It has been synthesized. Ascorbic acid is exceedingly soluble in water, and of all the vitamins it is most easily destroyed by heat. Human milk contains more of it than cow's or goat's milk. It is the practice in India to take boiled milk which contains still less vitamin C. Therefore, children who do not get sufficient mother's milk but depend on cow's or goat's milk should be given orange, grape or tomato juice to make up for the ascorbic acid deficiency. Very recently ascorbic acid content of many Indian foodstuffs has been analysed and it has been found that *Kul* (plum) *Batabi-Lebu* (*citrus decumana*) guava, mango, *lichi* and green chilli are the richest sources of vitamin C. All the above-mentioned fruits are now found to be richer than the Indian lemon and orange, the well known antiacorbutics." (*Indian Journal of Medical Research,* October, 1935 p. 350). We should depend on uncooked foodstuffs for this vitamin. Fruits are as a rule taken uncooked. The above-mentioned fruits are more or less abundant throughout India and in season they become cheap also.

Vitamin D

Deficiency of this vitamin is the chief cause of rickets, which is also produced by deficiency of calcium or of

phosphate. In the presence of ample D much smaller amounts of calcium and of phosphate are sufficient to prevent rickets than when there is only a small amount of the vitamin present. It conserves these mineral constituents in the body. The vitamin is also growth promoting. But its overdosage is toxic to most species of animals. It has been shown conclusively that continued excessive doses of vitamin D prove fatal to mice, rats, guinea-pigs, rabbits, cats and dogs. Man has greater capacity for resistance against overdose, although fatal cases in children have been reported. Birds are, however, unaffected by the overdose. Death is preceded by loss of appetite, loss of weight, and sometimes marked diarrhoea. Moderate overdosage of the vitamin is, however, without harmful effect. It is soluble in fat and is moderately resistant to heat. It is produced from ergosterol by irradiation or exposure to sunlight. Ergosterol is present in all animal and vegetable fats as well as in human skin. In a sunny country like India no one need, therefore, suffer from deficiency of this vitamin. Rubbing the body with some amount of oil and then exposing it to sunlight for some time is the best way of getting this vitamin. In Bengal villages there is a custom of rubbing the body of infants with oil and then exposing them to sunlight. This is a very good custom. But no one need think that a long continued exposure to sunlight would ensure maximum intake of the vitamin. Ultra-violet rays of sunlight which convert ergosterol into vitamin D also destroy the vitamin. So a moderate exposure which the system also enjoys would be the ideal thing.

It is also an alcohol like ergosterol and it contains the same number of carbon, hydrogen and oxygen atoms and double bonds as ergosterol, and as it has an influence on calcium (metabolism) the name calciferol has been given to it.

Excellent sources of calciferol are the liver oils of the halibut, tarbot and cod and the body oils of certain fishes. Egg yolk is a good source. Excellent sources of calciferol

after irradiation are yeast and egg yolk. Good sources are oils and fats.

Conclusion

As a result of the painstaking researches of scientists the importance of vitamins in our diet has been brought to light and some of these substances, which were at one time considered to be mysteries, have also been prepared in a pure state. But as night follows day some evil also followed this very laudable work of the scientists. There came a large number of artificial preparations in the market which brought fortunes to some at the cost of many poor men. These artificial preparations should by all means be avoided. Nature has provided ample amount for us — even for the poorest amongst us.

We can get enough of these vitamins from green leafy vegetables, cereals and pulses, cheap season fruits and sunlight. We need not make any abnormal change in our diet for the vitamins.

P. C. GHOSH

Harijan, 15-2-1936

6

PHYSIOLOGICAL BASIS OF NUTRITION

[The following are the findings of the International Commission of Experts appointed by the Health Committee of the League of Nations.]

Part I

ENERGY, PROTEIN AND FAT REQUIREMENTS

1. **Calorie Requirements**

(a) An adult, male or female, living an ordinary everyday life in a temperate climate and not engaged in manual work is taken as the basis on which the needs of other age-groups are reckoned. An allowance of 2,400 calories net per day is considered adequate to meet the requirements of such an individual.

(b) The following supplements for muscular activities should be added to the basic requirements in (a):

Light work :	up to	50	calories per hour of work
Moderate work :	,,	50-100	,, ,,
Hard work :	,,	100-200	,, ,,
Very hard work :	,,	200	calories and upwards per hour of work.

(c) The energy requirements for other ages and for mothers can be obtained from the following table of coefficients :

Age (years)	Coefficient	Calories
1 - 2	0.3	720
2 - 3	0.4	960
3 - 5	0.5	1,200
5 - 7	0.6	1,440
7 - 9	0.7	1,680
9 - 11	0.8	1,920
11 - 12	0.9	2,160
12 and upwards	1.0 (male and female)	2,400

Women :	Coefficient	Calories
Pregnant	1.0	2,400
Nursing	1.25	3,000

The requirements for babies under 1 year are difficult to specify except in terms of body-weight, but the following allowances are considered adequate :

Age (months)	Calories per kilogramme of body-weight
0 - 3	100
3 - 6	90
6 - 12	80 - 90

The muscular activities characteristic of every healthy child and adolescent necessitate additions to the basic requirements shown in (c). It is suggested that the activities of children of both sexes from 7 - 11 years be considered as equivalent to light work, of boys from 11 - 15 years as moderate work, and of girls from 11 - 15 upwards as light work.

Allowance must also be made for women engaged in household duties, whether pregnant or not; these have to be reckoned as equivalent to light work for eight hours daily.

2. **Protein Requirements**

In practice, the protein intake for all adults should not fall below 1 gramme of protein per kilogramme of body-weight. The protein should be derived from a variety of sources, and it is desirable that a part of the protein should be of animal origin.

During growth, pregnancy and lactation, some animal protein is essential and in the growing period it should form a large proportion of the total protein.

The following allowances of total protein are recommended:

Age (years)		Grammes per kilogramme of body-weight
1 - 3		3.5
3 - 5		3.0
5 - 15		2.5
15 - 17		2.0
17 - 21		1.5
21 and upwards		1.0
Women:		
	Pregnant	2.0
	Nursing	2.0

3. All the above figures on which the Commission has agreed are average values and it is essential that they should be interpreted in the light of this fact.

4. **Fat Requirements**

Fat must be a constituent of the normal diet, but the data at present available do not suffice to permit a precise statement of the quantity required.

5. **The Influence of Climate on Dietary Requirements**

In cold climates, the energy-content of the diet should be increased.

Part II

6. Mineral and Vitamin Requirements

The Commission recognizes the fact that the deficiencies of modern diets are usually in the protective foods (foods rich in minerals and vitamin) rather than in more strictly energy-bearing foods (rich in calories). Among the former are, first and most important, milk and milk products, eggs and glandular tissues; then green-leaf vegetables, fruit, fat, fish and meat (muscle). Among the energy-bearing foods of little or no protective power are sugar, milled cereals and certain fats.

Of energy-giving foods, unmilled cereals are not rich in protective nutrients and the more they are refined the less is their protective power. Many fats, especially when refined, possess little or no protective constituents. Refined sugar is of value only as a source of energy; it is entirely devoid of minerals and vitamins. The increasing habit of large sugar consumption tends to lessen the amount of protective foods in the diet and is to be regarded with concern.

7. Requirements of Pregnancy and Lactation

The Commission has attempted to define the quantitative needs of protective foods for perfect nutrition in terms of the requirements for the pregnant and nursing woman. She should be regarded as the member of the population needing the greatest "protection" in order to ensure adequate physical endowment for the child at birth and optimum nutrition during infancy.

The greatest difficulty in arranging such a diet is to provide adequate calcium, phosphorus, iron and vitamins B1, B2, C & D.

8. Milk, whole or skimmed, is a rich source of calcium salts and phosphates and of vitamin B2, also a good source of vitamin B1; milk fat is an excellent source of vitamin A. Eggs contain vitamins A, B1, B2, and D and are rich in iron. The proteins of these foods are not only

themselves of the highest nutritive value, but also improve the utilization of the protein contained in cereals and vegetables. Milk has an additional advantage in the abundance and availability of its calcium salts and phosphates ; these enhance the effect of any vitamin D derived from other articles of diet or from sunshine. Milk, although itself poor in iron, renders more effective the iron contained in the diet.

9. Ordinary diets are usually inadequate in vitamin D and except in sunny seasons and sunny countries a small daily ration of cod-liver oil is to be recommended in the diet of the pregnant and nursing mother and in that of the growing child. Fish-liver oils are the richest known natural sources of vitamin A and are also important sources of iodine. In goitrous regions, where sea-fish are not available the provision of extra iodine in the form of iodized salt or in some other way is recommended.

10. An extended dietary use of the potato is recommended to replace part of the sugar and highly milled cereals in the ordinary diet. Potatoes provide extra vitamin C and more readily available calcium and phosphorus than are present in cereals. Potatoes also yield more iron and B vitamins than milled cereals.

The above paragraph applies to countries where potatoes are abundant, but it is of general application, due account being taken of local resources.

11. **General Recommendations**

A. Although a simplified diet may be so constituted from a few protective foods as to be satisfactory, it is a general principle that *Variety in Diet* tends to safety, provided it contains a sufficiency of the protective types of food materials.

B. White flour in the process of milling is deprived of important nutritive elements. Its use should be decreased and partial substitution by lightly milled cereals and especially by potatoes recommended. The consumption of an excessive amount of sugar is to be condemned

and in this case also partial replacement by potatoes is urged.

C. Milk should form a conspicuous element of the diet at all ages. The Commission commends the tendency manifested in some countries to increase the daily intake up to one litre per day for pregnant and nursing women, as well as to provide an abundant supply for infants, children of all ages and adolescents. The practice of providing milk either free or at a reduced price to these is highly recommended.

The Commission desires to draw attention to the high nutritive value of skimmed and separated milk, which, although, deprived of its vitamin A through removal of the fat, retains the protein, the B and C vitamins, the calcium and other mineral elements. The Commission deplores the large wastage in many countries of this valuable food.

D. Fresh vegetables and or fruit should always be constituents of the normal mixed diet. Adequate provision of the vitamins other than vitamin D can be readily accomplished by inclusion in the diet of optimum amounts of protective foods. Where these are not available, only such vitamin preparations as are officially controlled and approved should be permitted.

E. The Commission emphasizes the need for provision of extra vitamin D, either as cod-liver oil or as irradiated products, wherever and whenever sunshine is not abundant, especially in the period of growth and during pregnancy.

Harijan, 25-4-1936

7
ARE YOU ACID ?

[Under the above heading Dr. H. C. Menkel, M. D. contributes to the *Oriental Watchman and Herald of Health* an interesting and instructive article from which we take the following important extracts.—Ed.]

"Quite frequently one hears the remark during a discussion about health, "The doctor says I am too acid." Just what does it mean being too acid ? And how does one become acid ?

"Being acid or having acidosis, is only a relative term. There is no such experience in actual life as a person being acid and still remaining conscious to tell about his acidosis. Acidity of the body tissues means death. The life process, and therefore, all the essential phases pertaining to health, well being, and resistance are predominantly alkaline.

"The human body represents a precarious organization of matter. Chemical study of the body materials reveals eighty parts alkali, and twenty parts acid. This relationship of four to one is the basic secret of health, normal functional activities, and efficient old age.

"All our practices, habits, customs, indulgences or deficiencies, both physical and mental, either promote or disturb this eighty-tweny ratio.

"However, the most determining factors for acid or for alkali formation are contained in food and drink. These are :

Acid Forming	**Alkali Forming**
Phosphorus	Potassium
Sulphur	Sodium
Silicon	Calcium
Chlorine	Magnesium
Flourine	Iron
Iodine	Manganese
Arsenic	Alluminium
Bromine	Copper
	Lithium
	Zinc
	Nickle

"These several mineral elements are so arranged in the different foods of daily use as to separate such foods into two classes — the alkali forming foods, and the acid forming foods. For convenience of reference we will list the more important foods under their respective classification :

Acid Forming

- Fish
- Fowl
- Flesh foods of all kinds
- Eggs
- Cheese
- Cereals (wheat, oats, rice, corn)
- Bread
- Chappati
- Legumes
- Nuts
- Refined sugar
- Sweets
- Confectionary
- Chocolate
- Lard
- Hydrogenated oils
- Coffee and tea
- Alcoholic beverages
- Fruits in syrups
- Flavoured soda waters
- Milk when boiled
- Milk puddings
- Fried and ghee cooked foods

Alkali Forming

- Green leafy vegetables
- Cabbage
- Asparagus
- Beets
- Carrots
- Cauliflower
- Celery
- Cucumbers
- Marrow
- Olives (ripe)
- Onions
- Peas when fresh green
- Potatoes
- Pumpkins
- Radishes
- Spinach
- Tomatoes
- Turnips
- Nearly all fruits
- Apples
- Apricots
- Bananas when thoroughly ripe, with skin spotted in brown
- Cherries
- Currants
- Dates
- Figs
- Grapes
- Lemon juice
- Oranges
- Peaches
- Pears
- Prunes
- Melom
- Milk when uncooked
- Whey

"Do you desire discovering if you have an acid tendency? Then answer the following questions under "Alkali effects," and "Acid effects." Allow yourself a mark of ten for each positive answer under both columns. Total the figures and you will have a fairly accurate gauge to your acid tendencies.

Acid Effects	**Alkali Effects**
Having Local infection, teeth, tonsil, nose or elsewhere	No known Local infection
Smoker	Non-smoker
Using alcohol	Non-user of alcohol
Heavy protein diet (over 2½ oz. daily of pulses, fish, fowl, meat, eggs, cheese)	Low protein diet (2½ oz. daily)
Heavy starch consumption (more than one serving daily of bread, porridge cake, rice, cereals, *chappati* or other equally high starch containing foods)	Sparing use of starchy foods (bread, *chappati* rice, oatmeal, cake, toast, sweets)
Foods cooked in fats or fried	No fried foods
Sparing use of fresh fruits	One fruit meal daily
Only scant use of green vegetables	Abundant use of both raw and cooked green vegetables
Drink little water	Drink several glasses water daily
Constipated	Two or three bowel movements daily
Using Aspirin and other drugs	Never use Aspirin or similar drugs
Given to worry and anger	Hardly ever worried or become angry
Little outdoor exercise	Regular outdoor exercise
Frequent late nights	Retire early and secure full night sleep

"A good concept of the acid process within the body can be gained from the quantity of acid waste substances which are constantly being eliminated.

"Thirty quarts of carbonic acid gas is normally eliminated by the lungs every hour. All this quantity of

acid gas is largely the result of digesting the sugar, starch, fat and protein of the daily food intake. If the meals contain an excess of these carbonic acid forming substances there is a heavier tax on elimination. Sedantry habits with "good feeding" may easily overburden lung elimination, with resultant chronic acidosis effects.

It is estimated that one third of the total body acid wastes are disposed of through the lungs. This leaves another two thirds to be eliminated by kidneys, skin and bowels.

"An amount of blood equal to all the blood in the body (six quarts) passes through the two kidneys every seven minutes for the purpose of eliminating acid waste products of a nature that cannot be eliminated in the form of gas through the lungs.

"A test of urinary acidity is a very good index to body acidity. This should be done at frequent intervals as a check upon health standard. Normally the urine is slightly acid. It is found that persons who are producing an excess of acid may have a urine reaction showing from 100 to 1000 times as acid as the blood.

"Such excessive strain on the eliminative function of the kidneys will result in disease of these organs. Nature attempts to guard against such damage by the followng measures.

"Acids are not normally eliminated or disposed of in a free acid state since any attempt to pass free acid substances through the blood or eliminative organs would produce serious damage to all the tissues contacted. Therefore as quickly as acids are freed through digestion and metabolism nature binds them up with alkali substances, thus forming organic compounds with an acid radicle but hedged about with alkalis to render the acid as little acid as possible until it is safely disposed of from the body.

"When the daily food intake does not provide these acid binding buffer substances in the required quantity, then nature's only recourse is to withdraw reserve alkalis

from the blood and body tissues. Teeth and bones are a good source. When calcium is withdrawn from the teeth they begin to decay. For meeting quick demand the supply is obtained from the softer tissues.

"Whenever the tissue alkali reserve is lowered only a few points of a degree the depleted tissues become irritable, painful and inflamed. This state of tissues irritability due to depleted alkalinity is termed rheumatism, neuritis, arthritis, myalgia, fibrasitis, lumbago, and various other names according to the location or structures affected. The cause is the same in each case, depleted alkalinity, produced by attempting to safeguard the organism from the deadly acid effects of our habits and practices.

"A small amount of acid forming substances are necessary for incorporating into muscle and nerve tissues. The quantity thus required is represented by two ounces of meat, or one large egg, or two ounces milk curds, with the addition of one or two slices of bread (double roti) or the equivalent in *chapaties* made from freshly ground, unsifted wheat flour. More than this quantity of the acid forming foods means excess, and tends to acidosis.

"The principal alkalis used for binding acids are sodium, potassium, calcium, magnesium, iron, copper, zinc, nickle and aluminium.

"These acid-binding alkalis in their most desirable state, and in abundance, are found in vegetables, particularly the green leaves, and ripe, fresh, uncooked fruits.

"The renowned Dr. George W. Crile is reported as stating, "There is no natural death ; all deaths from so-called natural causes are merely the end and point of a progressive acid saturation."

"We should therefore avoid hastening the point of acid-saturation by providing nature with an abundance of acid-binding foods, and by adopting other alkali-favouring habits and practices.

"After checking your acid-alkali standing by these two tables, and, should you find yourself quite definitely on the acid side, this indicates that you are positively

overdrawing your deposit of health credit, and it is only a matter of how much alkali you still have deposited in body storage system, and how rapidly you are depleting this reserve, to determine the time when you will begin having pains, discomforts, ill health and succumb easily to infection.

" Having thus discovered what practices are putting you strongly on the acid side you will also have learned what to do, and how to reverse this process, and to place yourself on the alkali and health constructive regime.

" Let it be remembered that ripe fruit and fresh green coloured vegetables represent both the first line of defence and the reserves in health conservation and rebuilding. These wonderful alkali forming food-medicines were intended in nature's original plan to constitute eighty per cent of our food intake. Accordingly there should be in all of our meals four ounces of fruit or green vegetables for every one ounce of food listed in the acid forming column."

H. C. MENKEL

Harijan, 22-2-1936

8

WHAT AND HOW MUCH TO EAT ?

[Dr. Menkel's article *Are you Acid* ? reproduced in these columns seems to have proved an eye-opener to many. We summarize three more articles of his from the *Oriental Watchman and Herald of Health*, under a heading which suits the summary. — Ed.]

How Much and How Often ?

There are diseases consequent to excessive eating, too frequent meals, and the over-indulgence of concentrated starches, sugars and proteins. To avoid them there are certain axioms which should be borne in mind. Only a certain definite quantity of food material can be appropriated by the body organism during any given 24 hour day. This required quantity for an average person of about 150 pounds weight has been ascertained to be approximately :

12 ounces starch and sugar containing foods
2½ ounces protein foods
2 ounces fats
Suitable quantity of roughage
Adequate amount of organic salts
Small but essential quantity of vitamins

The above six classes of food elements are provided by nature in the form of rice, wheat, *dal*, vegetables, nuts, fruit and milk. The digestion of these requires *at least fourteen hours* in a normal individual. In a subnormal individual it will require more time. The digestion of food is a physical and chemical process requiring expenditure of a considerable quantity of body energy. It has been estimated that three meals daily require more energy for their digestion, oxidation and elimination than is expended in any other form of average work or play. Three or more meals daily means keeping all body tissues and organs constantly at work without any free period for rest, repair and recharging the vital batteries. This continual strain results in organic exhaustion and needs a regular recurring fast period. The fast is not a prolonged fast, but a regular planned part of daily regime, one or two rest periods between meals, of sufficient length to promote reconstruction and health building. *This will require less than three meals during the twentyfour hours.* For the average invalid or below par individual, two meals well digested with plenty of rest period between will promote recovery far better than three meals. Still others would do better on only one meal daily, as this is all they can really digest and assimilate. Begin by dropping first one daily meal. After a few days drop another, until you have reduced the number of meals to two. But do not make the mistake of eating as much in those two meals as you ate before reducing the frequency of eating.

Disease and Its Cure

Barring unusual accidents or strong hereditary transmissions, the major cause for ill health is violation of

nature's laws. Drugs never cure. The best that any such so called remedy can do is to contribute some mineral element, vitamin, enzime, hormone, chalon, or some other factor which nature can utilize for the emergency. All of what we may call essential medicines are contained in our natural foods.

Col. Robert McCarrison, in a paper read before the Far Eastern Association of Tropical Medicine, stated that "the most fundamental of all rules for the physician" was "that the right kind of food is the most important single factor in the promotion of health, and the wrong kind of food the most important single factor in the promotion of disease." Many of the diseases can be cured by altering our diet and methods of cooking our food which destroy much of the vitamins and mineral elements originally present in our food. The diseases resulting from bad food can be prevented and cured only by the use of less cooked food and more raw fruits, green uncooked vegetables and sprouted pulses, and by learning to use more freshly ground whole wheat flour instead of polished and stored rice. The following table will provide a ready reference to the more important regulating food factors:

Diseases Due to Deficiency of	**Food Source**
Vitamin A	
Loss of appetite, Physical weakness, Tendency to disease of eyes, ears, kidneys, lungs, skin, bladder. stomach and colon, pyorrhoea, anaemia. Slow mentality.	Whole milk, butter, cheese, egg yolk, yellow bhuta, yellow sweet potatoes, carrots and other naturally yellow and green coloured foods, fish oils, destroyed by cooking of these foods.
Vitamin B	
Indigestion of stomach and intestine, Constipation, Loss of weight and vigour,	Whole grain cereals, milk, buttermilk, green peas and legumes, *dal*,

Sub-normal temperature, Paralysis of muscle groups, Neuritis, Glandular and endocrine disturbance including thyroid, adrenals, liver and pancreas.	raw fruits, vegetables, egg yolk, honey, yeast, marmite. Part of group B is destroyed by cooking of these foods.
Vitamin C	
Loss of weight and physical weakness, Rapid heart and shallow rapid breathing, Bleeds easily, Low red blood count. Teeth decay easily and become brittle, pyorrhoea, heart and blood vessel disease, scurvy.	Raw fruit, especially oranges, lemons, tomatoes, guavas, leeches, mangoes, pineapple, chillies, sprouted grams, green leafy raw vegetables, potatoes, cabbage, milk. This vitamin is destroyed by cooking.
Vitamin D	
Unstable nervous system. Low resistance to tuberculosis and other infections. Deformed bones, rickets.	Egg yolk, whole milk, fish oils. Few foods contain this vitamin, but it may be secured by daily exposing some part of the skin to direct sunlight.
Vitamin E	
Anaemia due to inability to digest the food iron. Failure of placental function thus affects child-birth.	Whole grain cereals, milk, green vegetables and raw fruits.
Organic Salts. Sodium	
Diabetes. Disturbed bile secretion. Flatulence with indigestion, constipation. Sodium is necessary to render lime and magnesia soluble for assimilation. Elimination of carbonic acid is facilitated by sodium in the blood.	Raw fruits and vegetables.

Potassium	
Defective growth with impaired glycogen function of the liver.	Vegetables and cereals. Muscle tissue.
Low red blood cell formation. Spleen function impaired. Low nerve energy.	
Calcium and Magnesium	
In nature calcium is always accompanied by magnesium.	Fruit, vegetables and cereals. The green leaves contain relatively more calcium, while the seeds contain relatively more magnesium.
A large number of diseases of childhood involving tissue changes and development are due to deficiency of these combined elements.	
Abnormal intra-uterene development and difficult patturition.	Nuts, milk, yolk of eggs.
Softening of bones (magnesium).	
Iron	
About 75 grains of iron in the human body. It enters into the most complicated compound found in the human organism. Good blood with all its vital consequences can only be formed with the presence of organic iron compounds.	Green leafy vegetables, onions, radishes, carrots, strawberries, tomatoes, dates, apples, figs, coconut, walnuts. Bran of rice and wheat. Pulses, yolk of egg, milk.

Avoid Wrong Combinations

A modified form of mono-diet is often useful in some circumstances as a therapeutic measure. This may be accomplished by eating only one kind of food at a meal, but varying the food with each meal to avoid monotony

and still provide needed factors found in different foods. For persons with impaired nutritional function, this regime permits the digestive organs to give full attention to the digestion of the one food partaken during that meal. It also encourages better mastication and discourages overeating.

Recently while reading the book *Ministry of Healing* I found this very practical advice on the matter of food combinations: "Here is a suggestion for all whose work is sedentary or chiefly mental; let those who have sufficient moral courage and self-control try it: *At each meal take only two or three kinds of simple food*, and eat no more than is required to satisfy hunger."

It is not well to eat fruit and vegetables at the same meal. If the digestion is feeble, the use of both will often cause distress, and inability to put forth mental effort. It is better to have the fruit at one meal, and the vegetables at another.

The plan here suggested of allowing each meal to dominate in one distinctive type of food can with advantage be extended beyond the two examples mentioned. A favourable plan is to divide the daily food ration into one protein meal, one starch meal, and one fruit meal.

The first rule is to avoid combining at any one meal foods of a decided starch nature with foods that are acid.

Starch-containing foods require the fullest possible action of the alkali saliva for their digestion. Therefore such foods should be retained in the mouth and masticated until quite dissolved and reduced to a semi-liquid state. Each mouthful of starch food should receive this treatment which is not difficult after one has formed the habit of thorough mastication.

For this reason it is advisable to recommend taking one's starch requirement at one meal during the day, and refraining from introducing any form of acid food or acid-containing combination of foods at that meal. Such combinations as follows are to be avoided:

Tomato sandwiches ; Tomatoes with potatoes ; Tomatoes and rice or breads ; Macaroni with tomatoes ; Pies, tarts and puddings made of flour or other starch with acid fruits ; Orange and corn flour pudding ; Orange juice and bread, rice, potatoes or banana, should not be taken together ; Vinegar, *chutni* or pickles should not be taken together with any starchy food like rice or potatoes ; Marmalade or jam made of acid fruits, with bread or cake ; Tea is acid, it will retard digestion if taken with bread, cakes or other starch foods.

In our experience at the Simla Sanitarium we have observed that the foods which combine best and cause the least trouble during their combined digestion are :

1. Fruits and milk.

2. Bread, *chapatis* or porridge cereals with butter or cream, may be combined with any one or two of the following :

   Bananas, almonds, dates, figs, sweet raisins, honey, milk. Any three of these would make a good combination.

3. Bread, *chapatis*, porridge or rice will also combine with vegetables and *dal*, but none of the above fruits should then be used.

4. Rice with tuber and green vegetables, *dal* and olive oil.

5. Green leafy vegetables, both raw and cooked, combine well with such protein food as fish, fowl, eggs or meat, if one is using animal foods.

6. Flesh foods combine best with green leafy vegetables, but they will also combine well with acid fruits as apples, guavas, pears, oranges, mangoes, but it is best not to use both vegetables and acid fruit at the same meal with meat.

H. C. MENKEL

Harijan, 21-3-1936

9

QUESTIONS ON DIET

[We summarized some time ago Dr. H. C. Menkel's articles in the Oriental Watchman and Herald of Health under headings 'Are You Acid' (issue of February 22nd) and 'What and How Much to Eat?' (March 21). A reader of Harijan sent us a few questions arising out of these articles. Dr. Menkel has been good enough to answer those questions for us. — Ed.]

Q. 1. Does 'fruits in syrups' include those cooked with *gur* (jaggery) or only those cooked with sugar?

A. The reference to 'Fruits in syrups' usually applies to the fruits in cane sugar syrup as found in the general market. Gur or jaggery would have an advantage over refined cane sugar as it has not been deprived of its valuable mineral constituents. However, it must be emphasized that cooked fruit or fruit put up in syrup can never take the place of fruit in its raw or ripe natural stage. The cooking process destroys certain valuable constituents, and others are so altered that they are no longer available in their original values.

Q. 2. Can *gur* be taken (uncooked) wherever honey is mentioned? (Honey is expensive here).

A. *Gur* is the best of the available substitutes for honey, but is a different class of sweet, more difficult of digestion and not so well suited for meeting the body requirements as is honey and the natural fruit sugars.

Q. 3. Suppose one is unable sometimes to get the full quantity of vegetables, how much soda should one take per day to give the necessary alkaline effect?

A. Soda bi-carbonate serves as an emergency remedy when it becomes necessary to administer an alkali as a remedy, but it cannot be recommended for regular use to replace the organic alkali salts supplied in natural fruits, vegetables and unprocessed cereals. During the season when vegetables do not thrive well under ordinary cultivation, it has been found possible to

grow fresh vegetables in boxes as these can be kept in a favourable situation to encourage growth. Some are finding it possible to keep fresh green vegetables of the leafy type, all during the season by planting seeds in different boxes so that they will come to usable size at properly spaced intervals. Another useful substitute is the dried vegetable which may be used during the off-season.

Q. 4. Is butter acid-forming or alkaline ?

A. Butter in its natural state is neutral, being neither acid nor alkali.

Q. 5. It is sad to know that boiled milk is acid-forming. Is there any simple means of safeguarding milk without boiling it ? I have heard of peptorized milk but do not quite know what it is. Likewise can curds be made alkaline ?

A. The boiling of the milk is the only easily available means of rendering it safe. The boiling process produces certain chemical changes which renders unavailable some of the alkali salts, and therefore boiled milk serves as a drain on the alkali reserves of the tissue. This gives it an acidlike action in lowering body alkalinity.

Curds being protein they contain an excess of the acid ash-forming salts. This is the normal construction of proteins and they cannot be rendered alkali. The necessary provision is to use a sufficient amount of alkali ash forming foods to provide the normal ratio of one part of acid-forming to four parts of alkali-forming. It is not a question of converting the natural acid-forming food into alkali, but of providing a well balanced supply, one part of acid-forming into four parts of alkali-forming.

Q. 6. Do you know junket powder (rennet) ? It turns milk into junket (sweet curds) within about 15 minutes and without making it sour. Do you know if that is just the same as curds or is it alkaline ?

A. Junket made with rennet powder is a very excellent form in which to take whole milk. This is better than curds as it leaves the milk in its normal balance.

Q. 7. The article says that ghee-cooked foods are acid. Is ghee itself just put on the food at the time of eating also acid ?

A. Ghee is not acid in itself. When food is cooked in hot fat it produces certain changes in the food, making it difficult of digestion and fixing certain alkali factors so that they become unavailable as such. Food so prepared while not actually acid in itself, does have an acidlike effect in that it calls upon alkali reserves to facilitate its processing within the body. This depleting of the essential reserve alkali produces the same final effect as though the food were actually acid-forming. Cooking in hot fat or frying is the least desirable method of preparing foods. When food is thus prepared it loses important food values and is highly productive of digestive disturbance, fermentation and flatulence.

H. C. MENKEL

Harijan, 11-7-1936

10

IMPROVED DIETS

"One of the tasks of those who are striving to improve diet in India is to educate the educated," writes Dr. Aykroyd in *Health Bulletin* No. 23. He bemoans the fact that it is not only the poor, whose choice is extremely limited, who are ignorant and prejudiced, but also those who can afford an excellent diet who do not feed properly, with the result that their children suffer from malnutrition and food-deficiency diseases. Even for people with limited incomes effective improvement can be made with little increase in cost. He says it is desirable that children should consume upwards of 8 oz. of milk a day, but, if funds do not admit, then buttermilk or skimmed milk may be supplied, for " even a little milk is better than none. Careful experiments have shown that the giving of 8 oz. of skimmed milk daily to children fed on an average 'ill-balanced' Indian diet results in an acceleration of growth

and a great improvement in health and well-being." Calcium is found abundantly in milk, and children need relatively more calcium and other minerals than adults, just as they need relatively more protein. Rice being very deficient in calcium, its insufficiency is one of the most important defects of the rice-eater's diet. The milled rice-eater, therefore, needs more 'protective' foods — milk, green vegetables, fruits, etc. than the consumer of whole wheat or *ragi*. "Parboiled rice, even when milled, is superior in nutritive value (particulary as regards the anti-beri-beri vitamin) to raw rice milled to the same degree." Since diets among the general population are low in fat, Dr. Aykroyd suggests that "addition of extra vegetable oil (at the expense of a quantity of cereal supplying an equivalent number of calories) does not greatly increase expenditure. Pure ghee or butter is, of course, preferable to vegetable fat, but very much dearer." Fruits, he avers, must always be included in children's diets. Tomatoes, oranges and other juicy fruits are richer in vitamins than bananas.

A. K.

Harijan, 12-4-1942

11

PLACE OF CEREALS IN FOOD

[Shri Ishverbhai Amin, Chief Chemist and Technical Superintendent of the Alembic Chemical Works of Baroda, has prepared a chemical analysis of principal cereals and pulses commonly used in Gujarat and a note thereon. I give the important part of it below, omitting the detailed analysis as being too technical for the reader. The note gives the reader sufficient information for his guidance.

— M. K. G.]

The investigation was undertaken with a view to study the chemical constituents of cereals and pulses which form the main bulk of the daily food of a village farmer.

Referring to the results of analysis in the following pages, one can see that the lecithin in the soya beans on which much stress is laid nowadays is in a fair proportion in almost all the pulses and one need not be afraid of its deficiency, in spite of its being lower than that in soya beans or eggs, because while the latter are not consumed in a very large quantity, the ordinary cereals and pulses are, and therefore supply sufficient lecithin. The farmer's daily food in Gujarat is *Kodari*, Millet, *Dal* of *Tuver*, or *Math* the last two being replaced sometimes by *Mag*, *Val* or *Dal* of *Udad*.

The next important thing is that Millet, which forms the main food in the evening, contains 7.436 per cent oil, and *Kodari*, which is the noon-day meal, contains 5.941 per cent oil. In spite of the farmer's inability to provide for necessary portion of free fat in his daily diet, he is still getting it unawares by taking *Kodari* and Millet. Lecithin also is sufficiently present in Millet and *Dal* of *Udad*, while fairly good in *Math*, *Dal* of *Tuver*, and to some extent in *Mag*, *Val* and *Kodari*.

The total Nitrogen content in cereals allows easily to calculate the percentage of total proteins, but does not allow us to judge their quality. All the pulses contain 20 to 22 per cent of protein, but the proportion of protein soluble in cold water is highest in *Mag* and *Tuver*, which is two-thirds of the total proteins.

It is an established fact that medical men prescribe the use of boiled and spiced aqueous extracts of *Mag* and *Dal* of *Tuver* to even very weak patients, who first are allowed to begin taking food after they have abstained from taking it for a very long time. It is because they contain about 66 per cent of total proteins in water-soluble form, and hence are very easily digestible, causing thus minimum strain either to the stomach or the intestines. *Val* and *Dal* of *Udad* contain less soluble proteins which form four-fifths of the total proteins, one-fifth being only in the soluble form. It is a common experience to everybody that *Val* produces a lot of gases in the intestines due

to the insoluble nature and hence bad digestibility of its proteins.

Analysis of Ash gives a clue to their mineral contents. Calcium and Iron which are absolutely necessary in Bone and Blood formation are highest in *Math*, while Potassium, whose importance is established in the metabolic changes of the human system, is highest in *Dal* of *Tuver*. Phosphorus is fairly well represented in all of them. The mineral constituents may vary in the same cereal or pulse on account of the changing nature of available plant foods in the soils. While raising crops, the village farmer should be particular in at least properly manuring the lands on which he grows corn for his own consumption, otherwise he and his family are likely to be lacking in nourishment due to low contents of minerals in their daily food. It is not that grains and pulses alone should be the sole guiding factors in their nourishment, but there are other articles of food such as green and fresh vegetables and milk and butter which supply all the necessary vitamins.

The farmer's food should be balanced if his present stamina and vigour and health are to be raised to a higher standard, and some economical and philanthropical ways and means should be found out by which he is able to retain for consumption at least some milk, butter and green vegetables. His present poor condition does not permit him to do so, in spite of his producing them, as he has to sell all these products for making money. The farmer should be taught to reduce his monetary wants as far as possible, so that some of his produce is left to himself and his family for nourishment.

ISHVERBHAI AMIN

Harijan, 12-12-1936

GRAMASEVAKS TRAINING CENTRE
27 SEP 1955
T. KALLUPATTI

AN EXPERIMENT IN NATIONAL DIET

A striking experiment was carried out in Denmark in the last year of the Great War which has a moral for us in the present food crisis. The Danes as a people were, in the first instance, largely lacto-vegetarian in their diet. Then about 1870-1880 American wheat and barley from the virgin soil of the prairies began to pour in and forced the Danes to change their agricultural methods quickly. They began to raise pigs and poultry and became exporters of eggs and butter to England. They also became big eaters of meat and eggs themselves.

The blockade following the entry of the United States into the war created a serious situation for the Danes. Denmark had a population of 35,00,000 human beings and 50,00,000 domestic animals. Grain and fodder used to come from America. The sudden stoppage of the American imports created an acute shortage of these articles. Professor Mikkel Hindhede, Superintendent of the State Institute of Food Research, was appointed Food Adviser to the Danish Government to deal with the crisis. The question which he was called upon to decide was this. So far the pigs had provided ham and bacon for the English as well as the Danes. Would it be wise in this crisis to get rid of the pigs and let men eat the grain which otherwise the pigs would eat ? Hindhede decided it would be wise and so some four-fifths of the pigs and about one sixth of the cattle were killed. The pigs gone, the bran which was fed to them was set free and was utilized for making whole meal bread with the entire coarse bran incorporated. This was the celebrated Kliebrot which was made official for the whole country. In addition to it the Danes ate porridge, green vegetables, milk, butter and fruit. " No grain or potatoes were allowed for distillation of spirits, so there were no spirits." Half the previous quantity of beer was permitted. Only

people on the farms got meat. The people in the cities, about 40 per cent of the population got very little meat. Only the rich could afford beef.

The food regulations were begun in March, 1917, and were made stringent from October 1917 to October 1918.

An amazing result followed from the enforcement of this national diet. Death rate which had been 12.5 in 1913-14 now fell to 10.4 per thousand " which is the lowest mortality figure that has been registered in any European country at any time " (Hindhede). To express the results in another way, taking the average from 1906 to 1916 as 160, in the October to October year it was 66. " Even in men over 65 the figure fell to 76."

Before the fiat the Danes ate finemeal bread and wholemeal bread. Hindhede made them eat only wholemeal bread with extra bran. Its proportions were given out as 67 per.cent rye, 21 per cent oats and 12 per cent bran.

" Except for the bran which added vegetable meat for those who were animally meatless or meat short," observes Hindhede, " this bread was the bread which the Danes used to eat before the invasion of American wheat," and which had been the "national bread of Denmark for centuries."

Hindhede attributed the remarkable improvement in the national health of the Danes to (1) less meat, (2) less alcohol. " The bran largely filled the gap of the scanty or absent meat, bran having a good proportion of vegetable meat protein." He regarded his experiment as a "triumph of his previous teaching." " The reader knows," he wrote in *Deutsche Medizinische Wochenschrift* of March 1920, " how sharply I have emphasized the advantages of a lacto-vegetarian diet. I am not in principle a vegetarian but I believe I have shown that a diet containing a large amount of meat and eggs is dangerous to health."

PYARELAL

Harijan, 26-5-1946

13
REVEALING FIGURES

The following facts and figures taken from a pamphlet entitled *Food Crisis*, 1946, are of special interest in view of the food shortage:

Production of Foodstuffs in India (1945-46)

Rice	25.8	million tons
Wheat	8.3	,, ,,
Gram	3.0	,, ,,
Millets	7.5	,, ,,
Maize	2.2	,, ,,
Barley	1.7	,, ,,

The above quantity has been found insufficient for the total population of India and the estimated deficit is 6 million tons.

The Punjab, C. P. and Berar, Sind, Orissa and Assam are not exporters of cereals in normal times. The deficit areas are the N. W. F. P., Bihar, U. P., Madras, Bombay, Bengal, the States of Travancore and Cochin, all of which have to import either wheat, rice, millet, or all.

The production v. requirements of foodstuffs annually is as follows:

Foodstuff	Production million tons	Requirement million tons	Deficit million tons
Cereals	50	60	10
Pulses	7	12	5
Vegetables & fruits	Unassessed	At least double	..
Fish	0.6	9	8.4
Milk	22	35	13
Eggs	2660	146000	143340(No.)

The following is a table of balanced diet for the maintenance of proper health :

Cereals	14 oz.
Pulses	3 ,,
Green leafy vegetable	3 ,,
Root vegetable	3 ,,
Other vegetables	3 ,,
Fruits	3 ,,
Milk	10 ,,
Sugar and Jaggery	2 ,,
Vegetable oil, ghee etc.	2 ,,
Fish and meat	3 ,,
Egg	1 only

This diet yields about 2600 calories.

The adult Indian male requires	2600 calories
Female	2100 ,,
Child 12 and 13 years	2100 ,,
,, 10 and 11 ,,	1800 ,,
,, 8 and 9 ,,	1600 ,,
,, 6 and 7 ,,	1300 ,,
,, 4 and 5 ,,	1000 ,,
Pregnant woman	2400 ,,
Nursing mother	3000 ,,

But how much do they get in comparison with other countries ? The figures reveal a sorry tale :

Country	Calories per head per day
America	3,200
Great Britain	2,600
Germany (after the war)	1,600
Japan (under American occupation)	1,575
'Grim and dangerous level'	1,500
and India	960

No wonder the death rate and infant mortality figures are appalling :

Country	1942 Death rate per 1000	Infant mortality per 1000 births
Australia	10.5	39
Canada	9.7	54
America	10.4	40
Germany	12.7 (1940)	68
England	12.2 (1940)	54
Japan	17.6 (1938)	114 (1937)
India	22.0	163

and our expectation of life woefully short :

Country	Expectation of life at birth Males	Females
Netherlands	65.70	67.20 (1931-40)
New Zealand	65.46	68.45 (1934-38)
Sweden	64.30	66.92 (1936-40)
America	63.65	68.61
Denmark	63.50	65.80 (1936-40)
Union of S. A.	61.46	66.80 (1940)
Canada	60.90	64.70 (1940-42)
Ireland	59.00	61.00 (1940-42)
England	60.18	64.40 (1937)
Germany	59.86	62.80 (1932-34)
Italy	53.76	56.00 (1930-32)
Japan	46.92	49.63 (1935-36)
India	26.91	26.56 (1931)

Not until our people are able to get enough to eat, can all our schemes for proper housing or roads or even education and health be of any real avail. Adequate and proper diet is the first requirement of man, and to this end the energy of all Provincial Governments must be diverted forthwith if we are to live.

A. K.

Harijan, 8-9-1946

SECTION II: RICE, WHEAT AND GUR

14

THE MIRACLE OF UNPOLISHED RICE

Where rice is the staple diet, and there are hardly other articles of food like wheat to supplement it, the miracle that unpolished rice can work within a few weeks of its taking the place of polished rice is apparent from the following cutting from the *Madanpal,* the monthly magazine of the Madanpalle Theosophical School:

"The introduction of brown rice in the hostel has made a great difference to the weights of the boys. In the first two months, July and August, one added nine pounds, one eight pounds, one seven pounds, four added six pounds, three added five pounds, four four pounds, four three pounds, six two pounds, and six one pound. Four remained as they were, two lost one pound, one lost three pounds, and one who was excessively fat lost a superfluous five pounds.

"*Nearly all the main increases were during August, when only the brown rice was served.* Many who lost weight in the first month, when brown rice was alternating with white, more than regained the loss in the second month. Some have lost again in the holidays, but those who stayed here in the vacation mostly continued to put on weight largely.

"1. In the first month, under *mixed* rice *17 lb. were lost and 55 lb. gained* in the whole hostel (school section).

"2. In the second month, under *brown rice, only 5 lb. were lost and 100 lb. were gained.*

"These figures should convince all save the most superstitious believers in the devitalized and demineralized 'Nellore' rice. It is noteworthy also *that those who on their own wish have been allowed to have this tasteless insipid variety have themselves after a few days returned to the healthy and appetizing brown rice,* and that its popularity even among the college students is growing daily. One day in October when the supply ran short, there was *even talk of a strike* among our seniors against the substitution of white rice."

The teacher who conducted these experiments is Mr. Duncan Greenless who takes a keen interest in diet reform. The carefulness with which the experiments have been made and the results recorded is commendable and I hope other hostels and boarding houses will follow this example.

M. D.

Harijan, 28-12-1935

15

UNPOLISHED v. POLISHED RICE

[Evidence for unpolished as against polished rice goes on accumulating. The Poet the other day raised the voice of humanity against the ravages wrought by rice mills and milled rice. Prof. Basu, Professor of Physiology of the Presidency College, Calcutta, sums up the case for unpolished rice under the following points, and even shows that unpolished rice is a good equivalent of wheat. — Ed.]

(a) The pericarp which is rich in protein and vitamin B, a substance which confers immunity, especially to the digestive tract against bacterial infection, is nearly absent in milled rice, although it is present in *Dhenki*-hulled rice.

(b) I have been able to show by Van Slyke's micromethod that the proteins are decomposed much more readily in milled rice than in *Dhenki*-hulled rice, when both are stored in warm and humid atmosphere (*vide Proceedings of the Indian Science Congress* 1935).

This is probably one of the reasons why Beri-Beri breaks out in an epidemic form either during or after the rains.

(c) Large intake of milled rice causes an incidence of premature births and an increase in infant mortality (*Annual Review of Biochemistry* 1934). This has been found due to absence of vitamin B.

(d) The absence of vitamin B probably interferes with the combustion of starch in milled rice. (*Annual Review of Biochemistry*, 1934).

I may further point out in this connection that people who argue in favour of wheat (or *atta*) either do not know or ignore :

(1) That whereas *atta* contains 11 per cent protein, and rice (reddish variety) contains 8 or even 8.5 per cent protein, the biological value of protein of rice is 88 per cent (according to Robertson) or 94 per cent (according to Dr. K. P. Bose of Dacca). But that of wheat is only 40 per cent (the biological value of protein of milk being taken as 100 per cent). Accordingly, for protein supply to our body rice is to be preferred to wheat.

(2) That rice starch contains a small amount of phosphorus, an essential ingredient of our body, but wheat starch does not.

(3) That rice is regarded as an excellent fuel for our body (*vide Annual Review of Biochemistry*, 1935) and is, therefore, particularly useful for labourers.

It may be contended that wheat can be taken in larger amounts than rice without unduly loading our stomach. But the necessity of taking large amounts of rice for the supply of protein disappears, if we take sufficient amount of *dal* which is very rich in protein varying from 18 to 257). Further, rice can be taken in various forms, such as parched rice (*chura*), boiled rice, fried rice (*muri* or as *garuchakli*).

I may mention one great disadvantage of rice, as an article of food, viz., it is an acid food, but this defect can be corrected if it is taken with sags (green vegetables) or citrons fruits which are regarded as alkaline foods.

PROF. BASU

Harijan, 15-2-1936

GRAMASEVAKS TRAINING CENTRE
27 SEP 1955
T. KALLUPATTI

16
SAVING CEREALS

In view of the present cereal shortage in the country, certain experiments on diet were tried in Maganvadi. The following results which have been tested at Maganvadi will be helpful to save cereal consumption to some extent.

Rationing authorities in certain places are distributing *atta* instead of cereals and as the cereals employed are of lower quality there is a suggestion of adding calcium salt to the *atta* to make it more nutritious. We would suggest an addition to the *atta* of 15 per cent of cleaned groundnut cake. This will have many advantages :

1. There will be an outright saving of 15 per cent in cereals.

2. The protein content of the *atta* will be practically doubled.

3. There will be no increase in the cost ; if anything it may scale down the cost.

4. The groundnut cake is very rich in vitamin B complex particularly in vitamin B1.

There is no danger of the cake powder getting rancid as in the proportion in which it will be present in the *atta*, the anti-oxident property of the *atta* will be effective to check any hydrolysis.

Only good fresh seeds should be taken, cleaned, by hand-picking and pressed in bullock-driven *ghani* presses. The extraction of oil being by cold process no nutritious ingredients of the groundnut are lost. The oil is pressed out leaving only about 10 to 11 per cent in the cake. The cakes are broken into small pieces and dried in the sun. The cake so treated will remain quite fresh for at least one week and retain its flavour. They get bone hard and can be cracked to a fine meal in a pestle and mortar. This meal can be fed in the hand *chakki* to pulverize and bring it to *atta* consistency.

The 15 per cent of its addition will mean in the normal diet a daily consumption of less than 1½ *chhataks*. There is no difficulty in making the preparations of the

atta. It retains all the good points of the whole cereal *atta* plus a special nutty flavour which makes food all the more tasty. This flavour may be very negligible when only 15 per cent of groundnut-oilcake *atta* is added and only on a larger addition can the taste be fully appreciated.

The cake contains over 50 per cent of high grade protein.

Scientific experiments elsewhere have also established high grade digestibility coefficient of groundnut protein. It ranks with the microbial protein of yeast and closely approximates animal protein as found in milk, eggs and mutton.

After many experiments we have come to the conclusion that 1 to 2 *chhataks* of groundnut oil-cake can be easily digested and taken along with cereals making the preparation more palatable. The cake bits are soaked in water and in two hours or so they disintegrate forming a uniform paste. This paste can be mixed with *atta* and made into *chapatis*. The proportion of 1:5 is quite good. The paste adds to the flavour of the *dal* or vegetable, if cooked along with these. It is very tasty when used in the preparation of *dalia* or porridge with cereals half and half or even without that.

Such use of groundnut cake will release some of the cereal needed and will be a very good health-giving food.

Sweet Potatoes: Sweet potatoes are rich in starch and can form a good substitute for cereals. These should be cooked over steam. If cooked with water, almost all the water should be allowed to evaporate, for, otherwise much of the mineral salts will get dissolved in the water and would have to be discarded with the water.

Sweet potatoes can be taken mixed with vegetables, milk, curds or in any other convenient form. If at any of the meals, cereals are to be totally substituted by this, a little more of sweet potatoes should be taken on the weight of the usual consumption quantity of cereal.

D. K. GUPTA

Harijan, 6-4-1947

17
USEFUL SUGGESTION

The method now in vogue of first grinding grain into flour and then making *chapatis* or bread out of the flour is wasteful. The defects of the method are as follows :

In the process of grinding in mills at a high speed, the properties of protein, starch, cellulose and mineral salts are altered while the fat content is lost, as in the process the flour gets hot. In the preparation of dough of workable consistency, the flour absorbs only half the quantity of water to its own weight, with the result that starch does not swell and in turn makes the food only partly nutritive due to insufficient proportion of water. In the East, the dough is rolled into shapes called *chapatis* and *puris* which can either be cooked or baked, but are fried with ghee or oils, and in so doing only a skin forms on both the sides. In the West, the dough is mixed with yeast for the preparation of spongy bread, but this too is neither fully nutritive nor hygienic as claimed, as the vitamins together with other constituents of food value are destroyed by the alcoholic fermentation due to the action of the yeast. Hence, the food prepared with this age-old process is neither tasteful nor hygienic, nor fully nutritive nor easily digestible, and even for partial digestion needs a large quantity of digestive fluids, like bile, gastric juice and pancreatic juice. That a sick person cannot be fed with this food is a popular recognition of this fact. Even biscuits cannot be said to be better. Again, not being easily digestible, it causes constipation, the cause of all disease. Besides, before the preparation of dough, the flour is sieved to remove bran, which means a loss. The flour being liable to easy attack by microscopic germs, it cannot be stored for a long time and considerable loss occurs in transport and use, all of which make its use uneconomical.

All these defects can now be surmounted with the process developed after extensive experiments conducted with a view to increasing the nutritive value of cereals, particularly wheat, *bajri* and *jowar*, so that the food made out of these cereals can impart immense health.

According to this new process, a known quantity of wheat with about three and a half times water by volume, i.e. one pot of wheat and three and a half pots of water, or 1 lb. of wheat and 4 lb. of water, is hydrated by gradual boiling, with or without the addition of a teaspoonful of sugar or jaggery under low heat, keeping the lid on if an ordinary pot is used. Prior to heating, if wheat is steeped in water for about 12 to 18 hours, fuel will be saved. In case a pressure cooker is employed, the ratio of wheat and water should be one to one and three-quarter by weight. The proportion of water to be used varies according to the quality of wheat. In so cooking or boiling, about 2 lb. of water is removed by evaporation and starch, bran and other constituents swell by absorbing water, and wheat become meaty. In this manner cooking or boiling should be continued till only a little water is left, which too will be absorbed by the wheat when it cools. Heating should neither be continued till water is completely evaporated for then hydration will not be sufficient, nor should the water from the pot be thrown out, for if removed it means a loss of soluble constituents of wheat. When wheat is cooked completely, which can be seen either from its swollen state or by pressing between the fingers to determine the softness, a little salt may be mixed with it to impart taste.

Wheat so cooked should then be masticated or ground to a paste, which can be accomplished with the aid of mincers, or by grinding on a *masala* stone, or pressing with two wooden pieces. With the use of pressure cooker, wheat inside will be digested to a pulpy dough of workable consistency. The paste so made can be made into shapes like *puris*, *chapatis*, and biscuits by the known method, and fried with known fats or oils, for consumption.

In places like Bombay where at times grain cannot be had but only flour, one may first make a dough of the flour as usual when making *chapatis,* put the dough in a piece of cloth and hang it over a pot of boiling water till the dough gets completely cooked with the steam. *Chapatis* should then be made out of the cooked dough, following the usual process.

The advantage of this new food is that by it about fiftyfive per cent wheat is saved — forty per cent by the absorption of about one and three quarter times water, ten per cent by retaining bran, and five per cent by elimination of wastage. This means that a month's provision will last for two months. Actually, with this process, the volume of wheat increases to two and a half times, i.e. one pot on cooking becomes two and a half pots. This means that from a quantity of flour required to make four *chapatis* with the old process, ten *chapatis* can be made from the same weight of wheat with this process, without altering the thickness and size.

Besides, the food is more tasteful, hygienic, and nutritive and easily digestible as the known and unknown constituents of food value are retained and evenly distributed. As such, its consumption will add a marked amount of weight. Moreover, being easily digestible, it can be fed even to sick persons. Also, the process will facilitate storage of wheat, *bajri, jowar* and like grains for a longer time without decay, and will save wastage in transport of flour. Moreover, it will dispense with flour mills.

Above all, this method will mean food for all. The adoption of this activated food in India will save every year about 8 to 12 million tons of wheat costing approximately Rs. 300 to 450 crores at the rate of Rs. 360 per ton and a similar quantity of valuable *bajri* and *jowar.* As such it will eliminate the present scarcity of cereals and will make the future bright for our famished people.

M. A. CHADRAY

Harijan, 14-7-1946

18

WHITE v. BROWN SUGAR

A correspondent writing to the *British Medical Journal* says:

"Lest it should be thought that there is no satisfactory answer to the very pertinent questions about sugar asked by "A. F. S." in the *Journal of November* 17th (P. 928), may I be permitted to try my hand at a brief exposition of the situation? The substances intended for man's consumption — the proteins, carbohydrates, fats, vitamins salts and catalysts are in Nature associated with each other and with other substances in such a way as to render them readily acceptable to the human economy. If, in his presumptuous ignorance, man tampers with these substances by cooking them, concentrating them, and refining them he may retain the main proximate principle, but he deprives it of the associates which render it tolerable to the human digestive organs. If, for example, he concentrates a bison into a beaker he may get the major portion of the protein, but he will get very little else, save perchance a stomach-ache. That is an extreme case. That of sugar is almost as extreme though not quite. Pure sugar (C12 H22 O11) is a very irritating substance, as may be seen from the eczema which is so apt to trouble the hands and arms of grocers who handle it. In its natural state as in the cane or in fruit, sugar is associated with various substances which dilute and mitigate the irritant properties of the pure chemical. The reason why brown soft sugar is more digestible than the white is that the brown is much less refined than the white; the browner it is the cruder and the more digestible".

M. D.

Harijan, 15-2 1936

19

THE HAVOC OF SUGAR

As regards the havoc wrought by sugar let me quote Dr. Plimner, Professor of Chemistry in the University of London: "Barker's and Hoffman's statistics show that cancer and diabetes are increasing all over the world, and at the same time there has been a corresponding increase in the consumption of white cereals and of sugar. Such a diet, with its shortage of vitamin B, is known to be responsible for the preliminary troubles which may culminate in cancer or diabetes. Yet we put up sugar factories in this country, assisted by the Government! We ought to eat the whole sugar cane or the whole beet, or sweet fruit, but not the extracted sugar. We need the residues which are discarded....If wholemeal flour were substituted for white flour and the amount of sugar reduced, there would be no shortage of vitamin B in the diet of the people as a whole...Sugar in its concentrated form is not a natural food...Sugar forms no part of the diet of the Indian hill tribe of the State of Hunza whom Dr. McCarrison describes as living on natural foods and having the perfection of health and physique."

When Dr. Aykroyd says that "sugar is almost all carbohydrates", he distinguishes it from jaggery which is rich in vitamin B, and 3.6 per cent protein, .06 per cent fat, .65 per cent mineral matter, .05 per cent calcium, .38 per cent phosphorus, 11,40 per cent mgs. of iron, and therefore to be always preferred to sugar which contains none of these necessary ingredients.

M. D.

Harijan, 19-6-1937

20
BAD TEETH AND REFINED CARBOHYDRATES

[The following note is sent by a medical friend.—Ed.]

It has been observed in the past that the incidence of dental caries in the West has increased in proportion to the increase in the consumption of sugar, candies, chocolates, etc. Sugar was regarded as the arch-enemy of teeth, the decay being set down to the fermentation caused by the presence of sugar in the mouth. Later on the deficiency of vitamin D came to be regarded as a contributive factor in the causation of dental caries. Lack of this vitamin leads to disturbance of calcium phosphorus metabolism in the body, and thus to deficient calcification of bones, teeth, etc. Moreover when vitamin D is deficient in diet various cereals have a decalcifying influence on teeth in different degrees, oats being the worst and rice and wheat being the least harmful in this respect. Recent research has, however, shown that it is not the excessive use of carbohydrates themselves nor the deficiency of vitamin D alone that is responsible for the production of dental caries. The use of *refined* carbohydrates, which is one of the features of the 'spread of civilization', is an important factor. It has been experimentally proved that crude carbohydrates contain a 'protective agent' which checks the process of dental decay. This protective agent is lost in the process of refining. *The British Medical Journal*, dated February 19 last, gives an account of the experiments of Osborne and his co-workers on the basis of which they have come to this conclusion.

Undecayed normal teeth were obtained from patients who had been advised extraction for various causes. These were immersed in various substances which had been held in the mouth for two minutes and well mixed with saliva; control being a mixture of saline and saliva. In one case the substance used was crude cane sugar juice, in another

refined sucrose. In still others whole wheatmeal and white flour, whole mealie meal and highly refined mealie meal (60-70 per cent), and whole mealie meal and 90 per cent of extraction mealie meal, were respectively compared. It was found in each case that the teeth in refined material decayed more than those in unrefined and in unrefined more than those in saline and saliva.

The diet of the African Bantu was also inquired into, to find out how civilization brings decay to Bantu teeth. It was found that dental caries was associated with machine-ground mealie meal, white bread and refined sugar. This further supports the conclusion arrived at from the above experiments that crude cane sugar and wheat are associated with some 'protective agent' which inhibits the process of dental decay and which is destroyed in the process of refining.

Thanks to the importance attached to the cleaning of the teeth the first thing in the morning and after every meal that has been handed down to us from the earliest times, and to the use of foodstuffs in their unrefined and natural form, the incidence of bad teeth is much less in India than among the people in the West. This splendid heritage of ours, however, is likely to be seriously imperilled, judging from the rate at which sugar and flour mills are multiplying in this country, unless the evil is checked in time.

Harijan, 30-7-1938

21

POTENTIALITIES OF PALM JAGGERY

Chemical Analysis

Ingredient	Kind of Jaggeries	
Sucrose or Cane Sugar	(1) Sugar cane 71 p. c.	(2) Date 57.57 p. c.
	(3) Coconut 85 p. c.	(4) Palmyra 83.8 p. c.

This shows that the jaggery made from the palm juices is akin to sugar cane jaggery.

Comparison of Date - Palm and Cane Jaggery

Ingredients	Jaggery	
	Cane P. C.	Date - Palm P. C.
1. Moisture	6.86	4.59
2. Cane sugar	71.0	57.57
3. Gluecose	15.72	16.0
4. Ash at 550oC	0.858	2.443
5. (Non-saccharine) Organic Matter	5.542	19.397
6. Calcium	0.329	0.1707
7. Potassium	0.3032	1.104
8. Sodium	0.1	0.24
9. Magnesium	0.058	0.098

Sjt. I. S. Amin, Chief Chemist of the Alembic Chemical Works of Baroda, says the following in his criticism of the foregoing comparative analysis made by him :

" The Date Palm *Gur* compares favourably with the best known Kolhapur Sugar Cane *Gur*. The percentage of Ash, i.e. minerals in case of Date Palm *Gur* is greater than that of sugar cane gur. In spite of high percentage of minerals in date palm *gur*, it will not be felt too saltish in food preparations. Some sugar cane *gur* prepared in Chorter

(Baroda State) is found to contain a very high percentage of minerals on account of the high contents of salts in irrigation waters from wells. Higher mineral contents in *gur* should not be a cause of prejudice against it. Potassium in the *gur* is fairly good. Potassium intake by human beings is important as it functions actively in the metabolisms of cell control and cell growth. Toddy (sweet) *gur* is superior to sugar cane *gur* on account of its containing vitamin B and B1, as these vitamins are associated with the yeast cells and which are sufficiently present in toddy (sweet). It is possible to maintain the activity of Vitamin B and B1, at a higher degree if rapid concentration in suitable shallow pans by skilful hand stirring is carried out at low heat."

GAJANAN NAIK

Harijan, 21-8-1937

22

NIRA — A NUTRITIOUS BEVERAGE

Nira, the sweet unfermented fresh juice, either of cocoanut, date, palmyra or sago palm, has been a popular beverage in some parts of our country since times immemorial. On account of ignorance of its nutritive value the people have not yet realized its dietetic importance. On the contrary some of them belonging to the literate class, believing hearsay, consider nira to be a deleterious drink. Others having curious conceptions about intoxicating drinks dislike it and would not help to popularize it as a national drink. They confuse it with toddy which is decidedly intoxicating. They little realize that nira benefits the addict and the abstainer alike. The fresh juice of the sugarcane is a fashionable drink all over the country. But sugarcane juice can become fermented like nira. A comparison of nira with sugarcane juice from a nutritive point of view will help to remove misapprehensions about nira. No less an authority than the Director of Nutrition

Research Laboratory, Indian Research Fund Association, (Coonoor S. I.), has made the following analysis of the two beverages :

	Components		Nira	Sugarcane Juice
1.	Moisture	per cent	84.72	75.9
2.	Protein	,,	0.10	1.4
3.	Fat	,,	0.17	0.6
4.	Mineral Matter	,,	0.66	0.3
5.	Fibre	,,	..	..
6.	Carbohydrates	,,	14.35	21.8

From the analysis of the minerals the proportion of the following important mineral salts has been determined :

	Salts		Nira	Sugarcane
1.	Calcium	per cent	0.149	Nil
2.	Phosphorus	,,	0.011	,,
3.	Iron	,,	0.26	,,

Medicinal Uses of Nira

In the *Indian Materia Medica* (By Shri K. M. Nadkarni) the following information is given about the nira of each kind of palm besides its valuable use as a raw material for *gur*-making.

Cocoanut Nira : "The unfermented juice taken twice or thrice weekly during pregnancy is said to have marked effect on the colour of the infant : it is said to be born of a fair complexion ; i.e. if of dark parents, comparatively fair ; if of lighter coloured parents, the offspring generally assumes European complexion ". (P. 231)

Date Palm : "The fresh juice is a cooling beverage." (Page 662)

Palmyra : "The palmyra juice is diuretic, cooling, stimulant and antiphlogistic when fresh."

> "The fresh saccharine juice obtained by excision of the spadix early in the morning is cooling, also acts as a laxative taken regularly for several mornings ; it is useful for inflammatory affections and dropsy ;

also in gastric catarrh and to check hiccup; as diuretic it is useful in gonorrhoea."

Sago: "The juice is internally nutritious and aphrodisiac; also laxative."

Gajanan Naik

Harijan, 7-1-1939

SECTION III: SOYA BEANS AND GROUNDNUTS

23
WARNING AGAINST SOYA BEANS

A friend uttered a warning which has considerable significance. He said: "I am quite in favour of the reforms you suggest. You may put as much emphasis as you like on the importance of vitamins in our diet. But please don't let in enemies unawares. Thus, for instance, one of the things much boomed about nowadays is soya beans. I agree that they are rich in proteins. But is it certain that our *mung, udad, masoor, chola,* peas, and such other legumes are very inferior to this exotic from China and Japan? I have an impression that all these should be almost equal in value to the now famous soya bean which seems to belong to the same botanical order. And even assuming that the soya bean is richer in protein, why should we not be satisfied with our indigenous beans? You, perhaps, do not see my difficulty. You agree that for articles of diet and clothing no country should be dependent on any other. Our country was completely self-contained in both these half a century or more ago. Foreign cloth now floods our market, and foreign wheat and foreign flour and foreign milk-powder and foreign butter now threaten our independence in the matter of foodstuffs. Cannot we do without this stuff which may ultimately cost us dear?"

"I quite agree. But we have begun to grow soya beans in various parts of the country, and there is no reason why we should not be able to produce all the beans we need."

"I know, I know. What we regard as successful experiments are being made. *The Punjab Agricultural Report* summarizes results of the experiments carried out on Punjab experimental farms, and they are encouraging.

The produce of what is described as Pusa white and Punjab yellow and other varieties ranged from 9 to 12 maunds an acre, and the report says that soya beans may easily be tried as a substitute for cotton. I am certainly in favour of these experiments. But I want you to realize that these experiments are made on farms where they have hardly any regard to expenditure. I have no doubt that foreign countries can produce these beans much cheaper than we can, and just as foreign countries have beaten us in the export trade of groundnuts, which is now seriously threatened, I should not be surprised if, after soya beans became the fashion in our country, our market were glutted with foreign soya beans, I would, therefore, utter this note of warning for what it may be worth."

Our friend needs no assurance that the warning will be heeded, and that not until the soya bean has been found a practical proposition for our average farmer, working with his normal implements and resources, will it be recommended by us for general acceptance.

M. D.

Harijan, 24-8-1935

24

SOYA BEANS

There are places where it is impossible to procure unadulterated ghee. It was partly with a view to getting rid of this eternal problem of getting good ghee that Gandhiji has been casting about for a substitute for milk and ghee. The high protein and fat content of soya beans and their procurability on the premises, combined with the successful experiment of Sjt. Narhar Bhave, encouraged Gandhiji to start the experiment in Maganwadi last week. Oil and ghee and part of the wheat ration was cut out of the dietary of those who joined the experiment and substituted by a soya bean ration equal in dietetic value. It is difficult yet to say anything about the results of the

experiments, but one might safely say that it is no longer the bugbear that it once used to be because of the unpleasant taste of soya bean milk. We soak the beans for a few hours and steam-cook them and serve them whole. The taste is similar to that of the bean known as *val* in Gujarat and Maharashtra and sometimes similar to that of cooked groundnut. As it swells to more than twice its size it is difficult to consume it as much as you do other beans and it requires a good deal of mastication. Let the reader also know that we have grown soya beans on our own ground plenty enough for our experiments.

Whatever the result, conservatives may note certain recent facts in the history of soya beans. The *Far Eastern Survey* for September 11 says that the United States has increased its soya bean acreage this year from 847,000 to over a million acres and its gathered beans will probably amount to 18 million bushels. "It may be assumed," says the paper, "that the growing interest in the soya bean and its products in the United States will be such as to increase both domestic production and consumption. With a steadily increasing acreage, the demand for seed will continue. The crop is used largely for feed and fodder; the oil is increasingly important in industry in paints, soaps, linoleum and so on. Although for a long time in the Orient the oil has been used in cooking and the meal has been used to some extent as a food, the soya bean is only beginning to figure in the American diet. An impressive number of foods — flour and flour products, candy, milks, oils, meat and margarine — in which it is used suggests a steady increase in its dietary use because of its high protein, fat and vitamin contents."

M. D.

Harijan, 19-10-1935

25

SOYA BEAN RECIPES

[A friend who is now in America sends the following recipes.—Ed.]

I have received many recipes from the Bureau of Home Economics, Washington, D. C., using fresh garden soya bean as well as their products. I have not yet been able to prepare all of them for myself owing to the scarcity of place here but they are worth trying and I like them. I, therefore, give some useful recipes here which I would try to prepare myself as soon as I find a little kitchen for me. In case fresh garden soya beans are not available, the dried soya beans can be used after soaking them in water overnight.

1. **Scalloped Green Soya beans**: 3 cups green soya beans (or dried soaked soyabean), water, 3 cups fresh milk, 6 tablespoons butter or ghee, 6 tablespoons wheat flour, one teaspoon salt, pepper to taste, one cup buttered bread crumbs.

Steam or boil the beans until tender. Heat the milk and thicken with the combined ghee and flour. Add this to the beans with the seasonings. Place in a greased baking dish, cover with the bread crumbs, and make until the mixture is heated through and the crumbs are brown. Tomatoes served with this dish make a good combination.

2. **Soya bean Salad**: One cup cooked Soya beans, ½ cup diced celery or *Mooli ki Gandar*, ½ cup diced cottage cheese, ½ cup diced carrots; one teaspoon finely minced onion, ½ cup freshly prepared tomato juice. Chill thoroughly and serve on crisp lettuce or cabbage.

3. **Salted Soya beans**: (I have done this at a friend's house and I found them very tasteful). Wash and soak the beans overnight, then drain and spread them till they become dry. Fry a small amount at a time in deep butter or ghee (I prepared in butter) at 350°F. for 8 to 10

minutes. Drain on absorbant paper and sprinkle with salt while still warm. Here I used the same variety 'Easy-cook.'

4. **Soya bean Vegetable Soup:** (I took this soup at one of the Cafeterias in Washington, D. C.) ½ cup chopped celery (we can use spinach), 4 teaspoons chopped onions, 3 cups water, 2 cups fresh tomatoes, one tablespoon salt, pepper to taste, 2 tablespoons wheat flour. Cook the celery or spinach and onion in water for about 15 minutes. Add the tomatoes, the soya bean pulp and the seasonings. Mix the flour with a little cold water, stir into the mixture until thickened and boil for 5 minutes longer.

Soya bean Sprouts: (I am enjoying them on every other day with my lunch). Soya bean sprouts may be used either raw or cooked in salads. I am informed by a Chinese friend living next door here that soya beans are used to a very considerable extent for this purpose by the Chinese; as soya beans sprouts are larger and firmer than those of most other legumes. In China soya bean sprouts are said to be used as a home winter vegetable, for the dried soya beans are sprouted easily in a short time under proper conditions of heat and moisture. Under the proper guidance of my neighbour friend I prepared soya bean sprouts in my little room here, and from ten days after that I am now enjoying these sprouts every next day as a part of my delicious lunch. The soya beans can be sprouted in a flower pot, or any container which has holes in it for drainage and which can be covered in case of strong sunlight or snow. The container should be large enough, *for as the beans sprout they swell to at least six times their original bulk.* Soak them overnight and next day put them in the container, cover, and leave them in a warm place. I place mine (a flower pot wide enough to contain about two dozen sprouts) close to the steam-heater in my room, and in the window when it is sunshine. The beans must be moistened at least twice a day during the sprouting period which will be 6 to 10 days. But fully grown sprouts will take nearly 15 to 20 days. I have always

been impatient to eat them early. There can be another method of sprouting these beans which can be tried. They should be spread one layer thick on a wet cloth and then should be covered with a heavy wet dark-coloured cloth which should be kept damp by frequent sprinkling. Dr. W. J. Morse of the Bureau of Plant Industry of the U. S. Deptt. of Agriculture gives the following composition of the soya bean sprouts :

	per cent		per cent
Water	67.00	Nitrogenous Materials	14.73
Fat	5.75	Carbohydrates	4.04
Mineral Salts	3.40		

Dr. Kellogg in one of his book on dietetics says that soya bean sprouts are specially useful in the winter season because of their richness in vitamins. " They have been much used," says the doctor, "in combating beri-beri and other deficiency disorders."

Soya bean Flour : Soya bean flour is made by grinding either the whole bean, preferably yellow seeded varieties, or the press-cake after the oil has been removed from the beans. The U. S. Department of Agriculture informs me that in invalid and infant dietetics soya bean flour has been used for many years in the United States, although as yet it is not a common commercial product. Extensive tests of the Bureau of Home Economics, Washington, D. C. show that the soya bean flour can be successfully used in making of bread, muffins, biscuits, crackers and gens. About one-fourth soya bean flour and three-fourths wheat flour is the proper proportion. " This addition of soya bean flour," says the Scientific Food and Nutrition Division of United States, " gives a more nutritious article of food with a rich nut-like flavour." When a special food of low starch content is desired, as for diabetic persons, a larger proportion of soya bean flour is used with some form of gluten substituted for the wheat flour. The report of the Farmers' Bulletin 1917 of the U. S. Agriculture Department is that on account of its high food value, as well as the palatable products made from it, soya bean flour is

finding increasing favour as a foodstuff in North America and Europe.

Soya bean Sauce: "Soy or shoyu sauce is a dark-brown liquid prepared from a mixture of cooked and ground soya beans, roasted and pulverized wheat (barley is sometimes used), salt, and water. This mass is inoculated with a culture known as rice ferment (ASPERGILLUS ORIYZAE) and left from 6 to 18 months in vats or casks to ferment. Soy sauce is largely used by Oriental people in cooking, as a relish or condiment to increase the flavour and palatability of the diet, and as an aid in the assimilation of food." (*Soy Bean Utilization* page 5).

One factory in the United States manufactures soy sauce from domestic-grown beans and has found a large commercial outlet throughout the country. Those who have used this soy sauce say that in odour and taste this sauce suggests a good quality of meat extract.

Soya bean Milk: Dr. E. J. Kingsley of the U. S. Food Nutrition Division writes that soya bean milk, although not equal to cow's or goat's milk in food value, may be used as a beverage or in any recipe that calls for milk. Where there are few dairy animals, soya bean milk is an important food for children and practically the only substitute for milk. It is said that in France and England soya milk is quite extensively in use. In America attempts are being made by some food specialists to manufacture soya milk powder on commercial scale. In one of the circulars recently issued by the Bureau of Home Economics, it is announced that soya bean milk contains most of the same food substances as that of the cow's milk but only one-sixth as much calcium, less fat, and no lactose (milk sugar). Its protein, though more "efficient" than any other vegetable protein, is less in quantity and not equal in quality to the proteins in milk of animal origin. Soya bean contains more water, and therefore less solids than cow's milk. Soya bean milk, according to Adolf and Kiang, has the following percentage composition:

Protein	4.22	Fat	1.87
Salts	0.40	Water	93.51

The composition of the milk will vary, of course, with the amount of water used in its preparation. From the above composition it is clear that it has no sugar and is very poor in salts, containing only half the amount of salts found in cow's milk.

Yellow seeded varieties of soya bean are the best to use for making soya bean milk and there are two methods of making this milk that I have noted here :

1. Wash the soya bean and soak overnight. Remove the skins and grind the beans very fine. Put the ground beans in a cheese cloth bag, in a bowl of lukewarm water, using three quarts of water to each pound of dried beans. Work thoroughly with the hands for 5 to 10 minutes. Wring the bag of pulp until dry. This milky emulsion thus obtained should be boiled on a low fire for 30 minutes, stirring frequently to prevent scorching. Add sugar and salt to taste. Keep in a cold place.

2. Wash the soya beans. Let them dry thoroughly, crack them, then grind them fine. To each pound of beans add 3 quarts of water, and soak for two hours. Then boil for 20 minutes, stirring constantly, then strain through a cloth. Add sugar and salt to taste. Keep in a cold place.

After separating the liquid from the solid material, the residue is still very rich in nutritive substances and can be dried and used for cattle food or made into flour for human food.

Soya bean Cheese : (TO FU) : This cheese-like preparation of soya bean milk found in Chinese and Japanese restaurants here. It is called TO FU. The method of its preparation is as follows :

Prepare soya milk as described above. When it is boiled add magnesium or lactic acid or one half per cent solution of citric acid in proportion to one-fifth of the volume of milk, stirring all the time. This milky emulsion soon becomes a greyish white curd which should be strained through a cloth to let out the yellowish water liquid.

Then dip the cloth in cold water several times to wash away the excess acid. Drain for about an hour and press out the remaining liquid. Season with salt and store in a cold place until firm enough to cut. TO FU is used in soups and salads and in other great varieties of Japanese and Chinese cookery. This TO FU is considered to be a valuable thing for the diabetics. Adolf and Kiang give the following percentage composition of TO FU:

Protein	10.22	Fat	3.66	Salts	1.09
Extract	4.13	Water	80.90		

Soya bean Oil: In addition to their food value, soya beans contain a valuable oil which is utilized to a very considerable extent in North America. In Manchuria, it is said, the soya bean is largely grown for oil and meal and is always relied upon by the Manchurian farmer as a cash crop. There are different processes or methods that can be used in the manufacture of oil from the soya bean. Here in America, I have heard that the oil is extracted from the ground beans by some chemical solvent such as benzol, naptha or ether. Bu I should think that the same methods of oil extracting that are used for cotton-seeds and linseed will do in extracting the oil from the soya beans too. Soya bean oil belongs to the group of drying oils in America. It can be tried as a substitute for either linseed or cotton seed oil, specially in soap-making. One of the Farmer's Bulletins published by the Department of Agriculture here writes that in the manufacture of soft soap, soya bean oil serves as an almost complete substitute for linseed oil, but unless it is hydrogenated it can but partially replace cotton seed oil in the manufacture of hard soaps. Here in North America paint manufacturers are using soya bean oil as a substitute for part of the linseed oil in certain kinds of paints. It is said that one of the principal uses of soya bean oil in China is food. Other trade uses of soya bean oil, in America, are in the manufacture of varnish, printing ink, paints, candles, waterproof goods, and for lighting, lubricating and rubber substitutes.

Soya bean Cake : Soya bean cake, after processing the beans for oil, is considered here in the Agriculture Department to be a most valuable product and has the widest usefulness. It is said that in European countries and in North America soya bean cake is used almost entirely for feeding purposes. It is considered to be a highly concentrated and nutritious and is relished by all kind of livestock. In China, I am told, it is used very extensively for fertilizing purposes and is also recognized as a valuable feed for working animals and for fattening stock. Like cotton-seed cake, soya bean cake contains some phosphorus and potash, a large portion of which is available, but its principal value in fertilizers is as a source of nitrogen. I give below the composition of the soya bean cake with reference to fertilizing constituents and a comparison with cotton seed cake. This analysis has been furnished by the Bureau of Chemistry and Soils of U. S. A.

Product	Constituents (per cent)			
	Nitrogen	Ammonia	Phosphoric acid	Potash
Soya bean (seed)	6.51	7.90	1.36	1.82
Soya bean cake	7.72	9.37	1.36	1.82
Soya bean cake *	7.18	8.72	2.37	2.92
Cotton seed cake	6.79	8.24	2.88	1.77

Harijan, 28-12-1935 &
4-1-1936

* This analysis is of the Solvent Process Cake.

26

A SOYA BEAN BOOK

A fair amount of literature has sprung up on the cultivation, properties and use of the soya bean, and Shri F. S. Kale, Food Survey Officer of the Baroda State, has written an exhaustive book on the soya bean * which is a kind of compendium on the subject of its cultivation and use.

The readers of *Harijan* know very well by now that the soya bean is the richest of all beans in proteins and fat and fat-soluble vitamins, and also know something of the experiments we made with the bean here in Maganwadi. Perhaps we were little fitted to pronounce upon the dietetic value of the bean, for in spite of our claim to do manual labour we are in no sense of the word manual labourers, and the bean is pre-eminently of use for those who labour hard with their hands and feet and those of our poor who cannot afford milk and ghee. A bean rich in proteins and fat is hardly the food for those with sedentary habits, but it is an effective article to supplement the defective dietaries of India, and added in proper proportion to wheat-flour it is good for all. Unfortunately, we in India, neither Government nor public bodies, have made anything like experiments worth the name and have to fall back on results obtained in foreign lands. Sjt. Kale says that there is a Soya Bean Research Institute at Moscow and that as part of the 'Five Year Plan', Russia has set aside vast tracts of land for its cultivation. "An exhibition of soya bean food," says Sjt. Kale, "was held where 300 varieties of soya bean dishes were prepared including cake, pastry, salads, biscuits, chocolates, toffee, tea, coffee, cut-

* *The Soya Bean: Its Value in Dietetics, Cultivation and Use;* By F. S. Kale. To be had of: (1) New Book Co., Kitab Mahal, 192, Hornby Road, Bombay. (2) I. P. Parekh, 192, Hornby Road, Bombay.

let, meat substitutes, soup etc. It was served to the representatives of trade union factories, engineers, Soviet Press, and the Red Army. The food was unanimously pronounced to be excellent." "Studies," he adds, "made by Osborne at Barbara's Hospital show that after a meal of soya bean the alkalinity of the blood is increased. Soya bean food neutralizes the acidity in the blood. It is very important from the medical point of view as the normal alkaline state is the state of highest health and physiological functioning while the acid state is a pathological condition. Protein from meat increases the amount of uric acid in the system and thus creates rheumatism, kidney troubles and gout. The protein from soya bean on the other hand neutralizes uric acid and does not produce any disease. It is said that gout is unknown in China. "It was found at the laboratories of Dr. Sherman, Professor of Food Chemistry at Columbia University, that the proteins of the meat and fish as well as eggs and grains are acid-producing while those of the soya bean are alkalizing in their effects." This would point to the value of the soya bean as an effective substitute for meat food.

The chapter on the cultivation of the soya bean is of great practical value, inasmuch as it is based on experiments made by the only State in India — the Baroda State — on a considerable scale. It can be sown in any season and is a summer as well as a winter crop, care being taken to sow it after monsoon where rainfall is excessive, and to sow it in the monsoon where the rainfall is from 30 to 50 inches. The author describes in detail experiences of individual cultivators in Baroda and C. P., which should be of great help to intending cultivators of the bean. It is regarded as a useful agent for improving the soil, as it transfers the nitrogen taken from the air to the soil and makes it rich and fertile, and as a live stock feed it is supposed to be of great value. Says Sjt. Kale : "Soya bean hay is very nutritious as a live stock feed on account of its high content of digestible nitrogen. The comparative feeding tests carried on in America with clover, alphafa,

cowpea and lucern shows the superiority of soya bean fodder to all other in point of production of milk and butter. It has been our experience that cows give more milk and put on more weight when fed on soya bean hay. It has been found at the Baroda agricultural experimental station that the bullocks showed great strength and agility and put on more weight when they were fed on soya bean hay.

As an article of diet I have already spoken about it. There are two or three things which are worth noting as of general interest. There is no doubt about the very high protein-value of the soya bean, and it is therefore a very valuable article of diet for those who do hard manual labour. But we are apt to exaggerate this value. One has to take into consideration the biological value of its protein in comparison to that of the proteins of other articles of food. Thus the biological value of the soya bean protein according to Dr. K. P. Basu is 56 (taking the value of milk protein as 100), that of fish protein is 98 and meat protein is 105 and according to Dr. Aykroyd that of the soya bean protein is 64, of egg 94, of whole milk 84 and of rice 65. Dr. Aykroyd is definitely of opinion that "soya bean protein, when fed as the sole source of protein in the diet, is definitely inferior in biological value to milk and egg proteins, but human diet usually contains a variety of protein derived from different foods, and there is evidence that soya bean protein can efficiently supplement cereal proteins. On the practical side my own opinion is that soya bean is a valuable food, when used in comparatively small quantities to supplement the largely cereal diets in India." Sjt. Kale, who is also a food expert, emphasizes the value of the bean as A SUPPLEMENT to wheat flour (15 to 20 per cent only to be added), as it is particularly rich in fat, mineral salts and vitamins. General Sir Robert MacCarrison advocates "the use of 'soya bean milk' for infants and young children, who cannot obtain a sufficiency of mother's or cow's or other milk," and Sjt. Kale gives the photograph

of his own baby who was fed on soya bean milk, with great success, for nearly two months. But for an authoritative pronouncement experiments carried on over an extensive area and for a sufficient period are necessary. What Sjt. Kale says about the capacity of soya bean flour to improve the quality of our *chapati* or *roti* seems to be highly likely: "Soya flour will enhance the nutritive quality of Indian *rotis.* Less ghee or oil will be required, as there is 20 per cent of fat in soya flour. The palatability of *roti* will be much better than the ordinary *roti.* The texture and the colour of *roti* will improve. The keeping qualities of *roti* will improve, and it will last for a longer time without being spoiled. By adding soya flour 15 to 25 per cent to our ordinary *roti* it will not only improve in nutritive quality, but it will also improve in digestibility. There will also be a saving of oil and ghee on account of the sufficient fatty content in soya flour. It will keep *roti* or *chapati* soft."

M. D.

Harijan, 19-9-1936

27

THE UTILITY OF THE GROUNDNUT

The following is the essence of Dr. A. T. W. Simeons' long article on the groundnut.

He opines that the low stamina of our people is primarily due to lack of protein, vitamins and salts in our diet. During the Bengal famine it was proved that the life of the victim of starvation depended more on administering protein than on starch. He maintains that if more protein could be provided, the net result on the national nutritional value would be infinitely better than of more cereals. Groundnut flour contains over 50 per cent protein and is richer in it than any other known vegetable substance and very edible. An acre of groundnuts can produce

many times the quantity of protein than an acre of wheat, millet or rice. And yet we are not making full use of it. 45 per cent of the groundnut crop is taken for the production of oil. "What happens to the remaining 55 per cent? If we can eat whole nuts, why cannot we eat them minus the oil? The economist answers, 'because we need the oil cake for feeding our cattle and for manuring our sugarcane and rice fields.'" Dr. Simeons argues that to use an edible protein for this purpose is criminal waste when we have inedible substances like dung, night-soil or guano to enrich our fields. "If we fertilize a sugarcane field with groundnut cake, every grain of protein we plough into the earth is lost; because sugar contains no protein at all—not to mention the loss of 10 per cent of residual oil in the cake, the vitamins and salts...We feed oil cake to our milking cattle. The milk output increases and milk is an excellent food, but if we feed a cow 10 lb. of nut protein, it is doubtful if this will produce even ½ lb. of milk protein. Is it worth it when we can achieve about the same result with cottonseed and other inedible products?"

Dr. Simeons quotes Prof. B. G. S. Acharya who, after controlled rat feeding experiments, has shown that groundnut protein was found to have a high biological value. Experiments, he says, have also established the high digestibility coefficient of groundnut protein. "It ranks with the microbial protein of yeast and closely approximates animal protein as found in milk, eggs and mutton."

"Clean groundnut oilcake contains over 50 per cent of high grade protein, 13 per cent more than mutton, so that with every ton of oilcake that is ploughed into the field, we are using the nutritional value of a flock of 50 sheep or 50,000 eggs or 15,000 seers of milk in protein alone."

Besides protein the groundnut contains fat, starch and minerals so that with the addition of a little extra starch and vitamin C, it is a complete food in itself. The

most important vitamin deficiency in India is of the B complex which has a profound effect on the health and longevity of the people. The groundnut is very rich in vitamin B complex, particularly in vitamin B1, Nicotinic acid and riboflavin, which are the most important factors. Mr. Kincaid, a missionary worker in a remote village of Kolhapur, testified that the children of his school have thrived on a cake made of clean hand-picked groundnut. The villagers have overcome their prejudices and use it as a daily addition of 1/2 - 1/5 portion to their usual cereals. Diabetics particularly have been thankful for the increased bread ration it enables them to enjoy. Children enjoy bread made from flour mixed with groundnut flour, many adults prefer it with a little salt. Groundnut flour can also be used for pastry and sweetmeats.

The controlled price of commercial groundnut is Rs. 75 per ton. Edible groundnut will be more costly. But Dr. Simeons opines that even if the price is higher than the commercial product, it will still be well below the cost of the common cereals.

From the manufacturer's point of view too, the switchover to edible cake will not dislocate either the oil or the groundnut market.

" India is estimated to produce about 1½ million tons of groundnut. Thus 7 lakhs of tons of the finest food can be made available from this crop." The protein value would be equivalent to 3500 crores of eggs or 1000 crores of seers of milk or 350 lakhs of sheep. The annual loss of starch, fat, minerals and vitamins is in addition and all due to the wrong use of this valuable nut."

A. K.

Harijan, 30-6-1946

SECTION IV: FRUIT

28

THE MERITS OF AMLA

Vitamin C or ascorbic acid, the vitamin which prevents scurvy, is found in fresh fruits and vegetables. Among vegetables, the green leafy varieties are the best sources. When pulses and cereal grains are allowed to sprout this vitamin C is formed in the grain and in the growing green sprouts. *Amla* (Indian gooseberry) grows abundantly in all Indian forests and is obtainable in almost unlimited quantities from January to April. The fresh juice contains nearly twenty times as much vitamin C as orange juice, and a single fruit is equivalent in vitamin C content to one or two oranges. It is possible to preserve *Amla* without losing much of the vitamin, for unlike other fresh fruits or vegetables it contains substances which practically protect the vitamin from destruction on heating and drying. *Amla* is included as an ingredient in many *Ayurvedic* medicines and tonics. It was found to be a most effective cure for scurvy in 1940 in the Hissar famine area. The above useful information is gleaned from *The Indian Medical Gazette* of March 1942.

A. K.

Harijan, 12-4-1942

SECTION V: MILK

29

SKIMMED MILK AND BUTTERMILK

[I had addressed a number of questions to Dr. Aykroyd, Director of Nutrition Research, Coonoor, and to Sjt. Satish Chandra Dasgupta, on the advantages and disadvantages of skimmed milk and about making it popular. Both of them have kindly favoured me with their considered opinions which will speak for themselves. — M. D.]

1.

Coonoor, the 18th May, 1937

Dear Mr. Desai :

I am sending under separate cover two copies of Health Bulletin No. 23 *The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets,* with a reprint of a scientific paper about skimmed milk, etc.

You ask a number of questions about the nutritive value of separated milk and buttermilk. Separated or skimmed milk is of high nutritive value, since it contains all the valuable elements present in whole milk except fat and vitamin A. Whole milk of good quality is to be preferred to separated milk because it contains vitamin A, but there is no question that the regular consumption of separated milk very greatly improves the health and development of Indian children fed on 'typical' Indian diets based largely on rice or millet, containing no milk or eggs, and very small quantities of vegetables. An important advantage of skimmed milk, of course, is that it is cheaper than fresh whole milk.

We have used imported dried skimmed milk in a number of experiments. Children receiving 1 oz. of dried skimmed milk powder daily for 3-4 months showed

greater increases in height and weight than children on a precisely similar diet without milk. The general condition of the milk-fed children showed remarkable improvement. The milk was given in liquid form, roughly 8 times its weight of water being added to the milk powder to 'reconstruct' liquid milk.

There can be no doubt that liquid separated milk would produce the same effect as dried powder, which is after all only the former reduced to powder by a mechanical process. Such milk should on no account be allowed to go to waste. Only a little organization is required to arrange for its distribution to school children, etc.

With regard to taste, we have found no difficulty whatever in persuading children to drink reconstructed skimmed milk, or, in another experiment now in progress, liquid separated milk. They seem to like it. I cannot agree that fresh separated milk has a bitter taste. I would suggest that any objection to the taste of such milk might be overcome by the addition of a little sugar. It could also be consumed mixed with cereals, in the form of pudding or porridge.

The transport of liquid separated milk is attended with the same difficulties as the transport of whole milk. Milk is a perishable article of food. Boiling or pasteurization to some degree extend the period during which milk remains fit for consumption. The only way to preserve milk is to turn it into cheese, or to condense, evaporate or powder it. The 'khoa' of Northern India, used in the making of sweetmeats, is an evaporated milk product which seems to keep for some time.

The distribution of liquid separated milk would have to be undertaken in the same way as that of liquid whole milk — i.e. on a daily basis. Boiling before distribution would cause no serious loss in nutritive value.

'Buttermilk' is a term which has several meanings in India. 'Buttermilk' made from curds — i.e. soured milk from which a good proportion of the fat has been removed — has roughly the same nutritive value as sepa-

rated milk, provided no water is added. If, as often happens, large quantities of water are added to 'buttermilk' of this nature, the resulting product is still called 'buttermilk' but of course its food value has been greatly lowered. A third form of 'buttermilk' is the liquid which separates out when cream is churned into butter. This type of 'buttermilk' is of relatively low nutritive value, since most of the valuable elements remain in the original milk from which the cream was obtained. It should, however, not be wasted, since it has some food value and is better than no milk at all.

One important fact should be borne in mind. Separated or skimmed milk is not suited to form the *sole* food of infants, because of its deficiency in vitamin A. If given to infants, it must be supplemented by some food substance rich in vitamin A — e.g. cod-liver oil. It may, however, be used with advantage to supplement the diets of young children past infancy when such diets are largely based on cereals and contain few vegetables and no animal protein. Separated milk in such circumstances is much better than no milk at all. Our own experiments have demonstrated its value as a food for older children. It would also be a very useful addition to the diet of expectant and nursing mothers.

I have no objection to your publishing this letter in the *Harijan*.

Yours sincerely,
W. R. AYKROYD

2

Buttermilk contains all the ingredients of whole milk except butter and vitamin A. If I were to valuate boiled milk in which vitamin C is destroyed, I would put the following values on the ingredients :

A.	Butter and vitamin A	8 annas
B.	Proteids	5 ,,
C.	Milk, sugar and mineral salts and vitamin B	3 ,,

If, therefore, whole milk is valued at 16 annas, buttermilk which contains items B and C should be valued at 8 annas. As a matter of fact it is sold proportionately for much less and is therefore a cheap but valuable article of diet for poorer people who cannot obtain whole milk. Where butter is produced on a manufacturing scale by separating cream from milk, the buttermilk is sometimes a drag on the manufacturer.

1. *Dahi.* Buttermilk can be made into *dahi* and sold locally. There is a limited sale for such *dahi* where large quantities of milk are handled. Where there are cheap means of communication such *dahi* is transported to distant places also.

2. *Chhana.* By souring buttermilk with sour *dahi* or acid substances like citric acid or alum the proteins are precipitated. This is *chhana. Ch ana* is also obtained by acidifying whole milk. But then that *chhana* brings down the fats with it also. *Chhana* from buttermilk is inferior to that from whole milk and sells cheaper. Manufacture of *chhana* is one of the common commercial uses of buttermilk. It can be carried longer distances than *dahi* but fetches less value. The sugar and mineral substances 'C' are left in the water after separation of *chhana. Chhana* is therefore less nutritious than buttermilk-*dahi* and has only 5 annas value as against 8 annas of buttermilk-*dahi.*

3. Casein. Buttermilk will yield casein which is another form of *chhana.* If there is no demand for *chhana* or *dahi*, casein can be made from buttermilk.

4. *Condensed Milk.* Buttermilk can be best popularized by being condensed and sold as condensed skimmed milk. Tons of 'Cowshead' brand skimmed condensed milk are imported. As I found by experiment, condensed milk can be made in cottages. There are difficulties to be overcome in proper packing, but they are not insurmountable.

Buttermilk is a dangerous substance if it or its products are passed off as whole milk. Dishonest persons

separate some cream from milk and sell the partially separated milk as whole milk or as whole-milk-*dahi* or whole-milk-*chhana*. The *dahi* or *chhana* of towns is frequently made from milk from which cream has been separated partially.

5. *Chhach*. *Chhach* is to buttermilk as *dahi* is to whole milk. When butter is taken out of whole-milk-*dahi* *chhach* is left. When butter or cream is taken out of milk, and the buttermilk is converted into *dahi*, it is equivalent to *chhach*. The appearances of such *dahi* and *chhac* are different but the substances are same. If buttermilk-*dah* is churned, it at once takes the appearance of and becomes indistinguishable from and identical with *chhach*.

For making milk-powder from whole milk or buttermilk special vacuum and steam heating machinery are to be used. Milk-powder cannot be made in cottages.

S. C. DASGUPTA

Harijan, 29-5-1937

SECTION VI: GHEE AND OIL

30

EDIBLE OILS

The most common edible oils of India are : 1. cocoanut 2. sesame (*til*), 3. mustard, 4. groundnut, and 5. linseed.

In this article I shall briefly discuss the food values of these oils in comparison with those of animal fats, as well as their comparative food values.

Animal Fats and Vegetable Oils

Both these classes of substances can be put under the common name fat. Fats are fuel foods, and in this respect vegetable oils are as good as animal fats ; that is, weight for weight vegetable fats supply the same amount of energy as animal fats (e.g. ghee).

As for digestibility, the vegetable fats are well assimilated in the human system.

But animal fats are superior to vegetable fats in one important respect, that is, with regard to their vitamin contents. Vegetable oils contain very little or no fat soluble vitamin (A or D), whereas butter contains a fair quantity of those vitamins. Fish liver oils like halibut oil and cod-liver oil are very good sources of those vitamins. It must be mentioned here that ghee cannot be placed in the same category with butter. Ghee in this respect is inferior to butter and contains little or no vitamin depending on its method of preparation. The very inferior vitamin content of vegetable oils is more than counterbalanced by its cheapness. Very few people in India can afford to take butter. But no one need worry about it. There are cheaper sources of these vitamins.

In a sunny country like India vitamin D is easily available. Human skin contains ergosterol which on exposure to sunlight is converted into vitamin D. Vegetable oils on irradiation or exposure to sunlight also give rise to vitamin D as they contain ergosterol.* So rubbing the body

* Exposure should be given in shallow flat dishes to have maximum surface exposed to sunlight ensuring maximum conversion to

with vegetable oils and subsequent exposure to sunlight is the cheapest and best way of getting vitamin D. It is an ancient custom in Bengal to rub the whole body of infants with mustard oil and then expose them to sunlight in the morning for some time, which is highly beneficial.

It is doubtful whether there is vitamin A at all in the vegetable world. But they contain carotene which is converted into vitamin A in the human as well as other animal systems. Raw carrots and spinach are excellent sources of carotene. Raw cabbage, yellow corn, peas and tomatoes are good sources. Sweet pumpkin, which is produced in large quantities in Bengal and which the poor villagers of Bengal take in fair amount, contains carotene. Other good sources are ripe mangoes and papayas. Poor people need not, therefore, rush to butter for vitamin A.

So considering the comparative prices of butter and ghee and vegetable oils I have no hesitation to say that for poor men vegetable oils are a fair substitute.

Comparative Food Values

The fat contents of coconut, sesame, groundnut, mustard and linseed oils are practically the same. 98-99 per cent of them is fat. And all these fats supply the same amount of energy to the body. I have already said that all these oils are well assimilated in the human system, so the question of digestibility is not of much importance. Habit is a great factor in this. A Bengali would not like the smell of linseed oil at all. He would rather go without any oil than take linseed oil. Whereas those who are not accustomed to mustard oil would find it rather irritating to the stomach on account of its sulphur-containing substance. But when one can accustom himself to any of these oils there is no difficulty of digestion, and fat values of all of them are practically identical.

But there is one point to be considered, i.e. the non-fatty portion of these oils. They have not been thoroughly

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vitamin. But this can best be done if the body is rubbed with oil and exposed to sunlight.

investigated from the nutritive point of view. Modern researches on vitamins have shown the importance of minute traces of substance in our diet. So it would be no surprise if one day scientists discover something in any one of those oils to declare its superiority over others. I am only hinting at the unknown possibilities which have up till now not been brought to light. Minute traces of metalic compounds of manganese, nickel, cobalt and other rarer metals may have great biological values which are still unknown to us. Ash of the linseed oil contains .0006 per cent manganese.

In the present state of our knowledge we can only say that all these oils are more or less equally good and one may take any one of them he finds cheap and suitable to his taste.

In conclusion I should like to say one word about the hydrogenated oils like cocogem etc. They are known as vegetable ghee. These hydrogenated oils are inferior to the natural oils in point of digestibility. And whatever little vitamin they may contain is also lost during hydrogenation. I am, therefore, definitely of opinion that hydrogenated oils should never be taken specially as they are costlier than common vegetable oils. It would amount to buying inferior stuff at greater cost.

Harijan, 14-9-1935 P. C. GHOSH

31

BLINDNESS AT A PRICE

We had already written about the evil effects of *vanaspati* ghee. Sir S. S. Sokhey, Director of the Haffkine Institute, Bombay, states that experiments conducted in the Haffkine Institute on the nutritive values of hydrogenated oil show that

(1) the consumption of hydrogenated oils resulted in inferior growth ;

(2) their consumption interfered with the absorption of calcium in the body ; and

(3) their consumption resulted in a change in the fat composition of the body.

Recently, in the Council of State, Dr. Rajendraprasad stated that the Research Institute at Izzatnagar had reported that the use of *vanaspati* was bad for health and affected the eyesight. Experiments conducted on rats show that the third generation of them become blind. In the light of these scientific experiments one would have thought that any Government with the welfare of the people in their mind would have banned *vanaspati* out of the country and locked up the *vanaspati* manufacturers as anti-social beings But India is tolerant even to the extent of hugging its evil-doers.

We understand that the Government is contemplating provision for the detection of adulteration of ghee with *vanaspati* by adding 5 per cent basic oil and colouring it. We fear that this will be absolutely of no use. *Vanaspati* is generally made of groundnut oil or cotton-seed oil. The addition of these oils in a small proportion will be of no avail for detection. Scientists are of opinion that at least 10 per cent of sesame oil (*til* oil) is the least amount that can be effective, and no other oils would be useful. Besides, the colouring can be removed at a very small cost. One wonders why there should be the need for all this circumventing of the issue.

It is clear that the expenditures incurred by these manufacturers are of no avail to the nation as a whole. They add nothing to the existing fat of the country. If anything, they decrease their assimilability by hydrogenation and to the extent they are destructive of the fat stock of the land. The fresh oils that are produced at comparatively low rates are acquired by these factories and at a cost which is often double the original cost ; they destroy the natural food values and make the nation subject to various deficiency diseases, and for this disservice the nation has to pay in the utilization of its man-power, capital and human effort. We are amazed at our action

when we sit down calmly and think over the *pros* and *cons* in regard to this question.

In so far as adulteration of dairy ghee is the main objective of this industry it is a direct hit on the dairy industry. In a country which is largely vegetarian, reduction of ghee consumption, however caused, will undermine the health of the people. The argument that Western nations use margarine will not hold in our country. Margarine is used like butter over slices of bread and in a temperate climate the hydrogenation needs to be carried out to a very little extent. In our country such a treatment will still leave the product in a liquid state. Besides Europeans obtain animal fats from various other sources as they are meat eaters and their cooking is done mainly with lard (animal fat). Hence, any comparison with other countries is fallacious.

India's is a cow-centred economy. We need cows for the plough, for transport, for carriage and for yielding milk. Hence, any measure that adversely affects the maintenance of the cow will also adversely affect our national economy. A correct view of the affairs in the proper perspective would make *vanaspati* production equivalent to cow slaughter, and we hope at least those who venerate the cow will look at this aspect of the question conscientiously and refrain from an industry which is based on pure avarice, ignoring all considerations of national welfare.

From the economic point of view the *vanasrati* mills in so far as they enter the market for vegetable oils tend to put up the prices of ordinary oils. So the poorer consumers of vegetable oil have to pay a higher price for the only source of fat that is available to them. The well-to-do classes who use this hydrogenated oil pay a still higher price for materials which may prove even harmful to them and perhaps obtaining nothing in return even by way of fat if the digestibility is impaired by hydrogenation. Apart from the raising of the price of oils even under controlled rates, because of the advent of capitalists in the

market, the tendency is towards black-marketing, which again has an injurious effect on the budget of the poorer consumers.

We are amazed at the recommendation of the Advisory Planning Board which has suggested the raising of the target of production of this article from 82,000 tons in 1941 to 400,000 in 1950. Are we thinking of industries as a means of making wealth for a few, or should our industries be the means of supplying the needed articles to satisfy human needs ? Are there no moral considerations to guide us in this matter ? Is our industrial policy to be devoid of all humanity ? If so, we are heading for the jungle. We trust that no time will be lost in calling a halt as far as this industry is concerned.

J. C. KUMARAPPA

Harijan, 6-4-1947

32
NAKALI GHEE

Our articles on *vanaspati ghee* brought in a sheaf of letters — of approbation from the public and of opprobrium from the manufacturers — naturally. A valued friend has coined *nakali* (imitation) ghee as the name for this product and we hope this will receive legal sanction as margarine (the word means imitation or *nakali* butter) has in Europe. An alternative name can be *devitalized vegetable oil.*

The burden of the battle cry of the manufacturers is stated below with our reactions.

One of the " scientific " minions of the manufacturers writes :

> " If one compares *vanaspati* with cow's ghee, then it is definitely inferior in its *food value*. However, when *vanaspati* is compared with the oil from which it is made, then it is definitely a better food article because (1) it has a more palatable taste, and (2) it has better keeping qualities."

This statement is typical of the half truths and suppression of facts on which the manufacturers' case is built

up. In dealing with ghee they admit the inferiority of *vanaspati* in "food value" meaning thereby nutritive value.

While dealing with the oil the comparison is not on the nutritive value but is shifted to its keeping qualities and taste only, while to the reader "better food article" will convey the idea of nutrition.

Again the comparison is with cotton seed oil or groundnut oil and not with coconut, *til* or mustard oils which are the commonly used edible oils.

Further the comparison is between the mill pressed oil and not with the cold pressed *ghani* oil. These statements are evidently calculated to mislead the unwary reader.

The manufacturers have launched out on a widespread, expensive advertising programme, by which they hope to confuse the public. They compare *vanaspati* to margarine. This comparison is not valid. While *vanaspati* is prepared from mill-pressed cotton seed or groundnut oil, margarine is not necessarily prepared from such inferior hydrogenated vegetable oils. The history of its manufacture dates back before hydrogenated oils came to be known. Generally it is made from softer animal fats or from a mixture of animal fats and vegetable oils churned with milk and chilled with ice to give it an appearance of a milk product. Because this animal-fat-based margarine is used widely in Europe and America and "eminent research workers agree unanimously that it is both wholesome and nutritious," it does not follow by any stretch of imagination that *vanaspati* manufactured from hot processed inferior vegetable oils is also equally nutritious. Why not push the same illogical argument one step further and say, "because ghee is nutritious therefore *vanaspati* ghee is also nutritious?"

They proceed to compare the price of *vanaspati* with the price of dairy ghee and claim that it is one-third. A true comparison will be with the price of mill-pressed groundnut oil. It would then be seen to be about fifty per

cent more expensive. We are entitled to ask what additional or proportionate benefit have the manufacturers conferred to impose this heavy tax on the unsuspecting public ?

One would think that these manufacturers are liable to be prosecuted for such misleading advertisements under the Defence (sale of goods) Regulations and by the consumers for damages.

In Great Britain cold pressed olive oil is held in high esteem. In any case cold pressed oils are better than mill oils. We should have expected the *vanaspati* manufacturers to prove their claims of superiority over cold pressed cocoanut, *til* or mustard oil. Then alone they will have a leg to stand on. If at any time cold pressed oil goes rancid it is not the process that is at fault but the carelessness of the oilmen.

The manufacturers claim that they are meeting the "tremendous shortage in fats in the country". Have they increased the fat content in any way ? All they have done is to transform good existing material into a bad and expensive product which will "taste better and keep better."

There are two ways of meeting this shortage : One is by increasing milk production and the other is to increase the production of cold pressed oils both by stopping export of edible oil seeds and increasing the cultivation of oil seeds.

The Chairman of the Vanaspati Manufacturers Association of India in his letter refers to the apprehension that traces of nickel found in *vanaspati* may "prove poisonous in the long run" and assures us that :

> "they would do no harm as it has been found that human beings can absorb and excrete relatively large quantities of nickel without any ill effects resulting therefrom", and that vegetables which people consume "such as carrots, onions, tomatoes, lettuce, etc. contain much larger quantities of nickel than is ever likely to be found in *vanaspati*."

He seems to be innocent of the fact that the nickel in the vegetables is in combination while that in *vanaspati* is definitely foreign matter. This will make a world of difference in the capacity of the human body to deal with such matter. The one may be excreted while the other may act as a poison.

Again the Chairman makes light of "Col. Sokhey's speculations" based on "two month old experiments on rats". We are not here to put up a defence on behalf of Sir S. S. Sokhey. He is quite capable of taking care of himself. But when the Chairman goes on to state that "to condemn *vanaspati* on inconclusive evidence, while the case is officially *sub judice* is to do a disservice to the country in general and to an important food industry in particular", and calls upon us "to withhold criticism until the Expert Committee publishes its findings", we feel he is applying the safety valve in the wrong place. If I am walking through the jungle with a child and the child is picking wild berries to eat and two villagers passing by express differing opinions on the poisonousness of the berries, would I suggest that the child should go on eating the berries while the question of their poisonous nature is *sub judice*? The prudent course will be to stop the child eating the berries pending satisfactory proof that the berries are wholesome. Similarly, if the Chairman feels the matter is *sub judice* we submit that the proper course for the manufacturers, on whom the onus of proof would lie, is to immediately stop producing *vanaspati* until conclusive evidence that it is not harmful is forthcoming. We trust this reasonable course will now be adopted by the *vanaspati* manufacturers without a legal injunction.

J. C. KUMARAPPA

Harijan, 25-5-1947

SECTION VII : TEA

33

ANOTHER RISING MENACE

In the rural areas milk is already in short supply. If we sincerely desire the welfare of the people, our attempt should be to find out ways and means of increasing the supply. No doubt the cities are dependent on the villages for the milk. If an organization can be brought into being whereby the cities can run their own dairies in selected rural areas and be independent of the existing supply from the villages, that in itself will alleviate the distress in the rural areas. Of course, alongside of this programme we must have the long range programme of increasing the milk productivity of the cow by selective cattle breeding.

Wherever people are in distress we always find somebody willing to take advantage of this distress. There are people willing to rifle the pockets of dead soldiers. Thus the distress of somebody presents an opportunity to some one else to take advantage of. At the present time the short supply of milk has provided a golden opportunity for the Indian Tea Market Expansion Board to carry on its destructive work. Mr. M. H. Miles, its Commissioner for India, is anxious to push forward to the villages and create the tea habit in the villages. This would imply, that by tanning the insides of the villagers and satisfying their hunger by decreasing the digestibility, we can automatically lessen their demand for milk! This is a real menace to the health of rural India. In a vegetarian country the animal protein from milk is an essential constituent of the diet. Any habit which is calculated to decrease this is harmful to the villages and is anti-social.

Papers carry advertisement "drink tea for stamina", which being lying propaganda must be stopped by the Government taking necessary steps to control the advertisements. Indian consumption of tea in 1928-9 was 48.8 million pounds and it has risen in 1945-6 to 130 million pounds. This is an increase of about 266 p.c. and yet they are carrying on a campaign of increasing tea consumption still further. Whatever may be said for tea for the well-to-do who are overfed, it is difficult to support the cause for tea in villages. The work of the Indian Tea Market Expansion Board, therefore, is a menace to the rural areas which are already starving and suffering from mal-nutrition. We trust the popular governments will do what lies in their power to prevent any irreparable damage being done by the formation of habits which will be injurious to the growth and strength of the village people.

J. C. KUMARAPPA

Harijan, 26-1-1947

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